

# **Exhibit A**

**CURRICULUM VITAE**

**LAWRENCE A. CRUM**

**Current Addresses:** Applied Physics Laboratory  
1013 NE 40th Street  
The University of Washington  
Seattle, Washington 98105  
(206) 685-8622

4662 175th Ave SE  
Bellevue, WA 98006

**Professional Titles:** Principal Physicist, Applied Physics Laboratory,  
Research Professor of Electrical Engineering,  
Research Professor of Bioengineering,  
University of Washington  
Chair, Dept. of Acoustics and Electromagnetics, APL

**Place and Date of Birth:** Caldwell, Ohio - 25 October 1941

**Marital Status:** Married to Jane Sampson Crum, four children

**Education and Degrees:**

<u>Years</u>	<u>School</u>	<u>Degrees</u>
1959-1960	Ohio University	-
1960-1963	U. S. Naval Academy	-
1963-1967	Ohio University	B.S. (Mathematics) 1963, <i>summa cum laude</i> M.S. (Physics) 1965 Ph.D. (Physics) 1967

**Professional Experience:**

2007-present	President, UltraSound Technologies Inc., 8223 Broadway, Everett, WA 98203
2007-present	Research Professor of Electrical Engineering and Bioengineering, University of Washington; Principal Physicist, Center for Industrial and Medical Ultrasound, APL, University of Washington
1998-2007	Principal Physicist, Applied Physics Laboratory and Research Professor of Electrical Engineering and Bioengineering, University of Washington; Director, Center for Industrial and Medical Ultrasound, APL, University of Washington

1992-1998	Principal Physicist, Applied Physics Laboratory and Research Professor of Electrical Engineering and Bioengineering, University of Washington; Chair, Dept. of Acoustics and Electromagnetics, APL.
1990 - 1992	Director, National Center for Physical Acoustics and F.A.P. Barnard Distinguished Professor, University of Mississippi
1988 - 1990	F.A.P. Barnard Distinguished Professor, University of Mississippi, and Associate Director for Basic Research, National Center for Physical Acoustics.
1987 - 1988	Acting Director, National Center for Physical Acoustics and Professor of Physics, University of Mississippi.
1986 - 1987	Professor of Physics, University of Mississippi.
1985 - 1986	Visiting Professor of Biophysics and Fulbright Fellow, Guy's Hospital Medical School, University of London.
1978 - 1985	Professor of Physics, University of Mississippi.
1977 - 1978	Visiting Senior Scientist, University of Wales, Cardiff, Wales, United Kingdom.
1968 - 1977	Assistant Professor of Physics (1968-1972); Associate Professor of Physics (1972-1978); 1973 ONR Research Professor; United States Naval Academy
1967-1968	Harvard University; Postdoctoral Fellow

**Honors, Awards, Achievements:**

Received Baccalaureate Degree Summa Cum Laude

Member Phi Beta Kappa, Phi Eta Sigma, Sigma Pi Sigma and numerous other honorary societies

Member 1963 First Team All America Fencing Team

1963 National Collegiate Athletic Association Fencing Champion

1973 ONR Research Professor at U. S. Naval Academy

1982 President's Lecturer at the International Symposium on Sonics and Ultrasonics

Awarded Distinguished Service Award in 1988 by the Institute for Technology Development

Member of Organizing Committee for 13th International Symposium on Nonlinear Acoustics held in Austin, TX

Member of Organizing Committee for 2nd NATO sponsored workshop on Natural Mechanisms for Sound Generation in the Ocean, held in Cambridge, England, July 1991

Plenary speaker for Ultrasonics International, Madrid, July 1989

Invited lecturer at several international symposia

Member of several special study sections at NIH

Organized and chaired several special sessions at meetings of acoustical societies

Member of Executive Council, Acoustical Society of America, 1989-

Fulbright Research Award, London, 1985-1986

University of Mississippi's Faculty nominee for Higher Education Appreciation Day at State Legislature, 1990.

Member of Scientific Committee, Sea Surface Sound-97

Member of Scientific Committee, First World Congress in Ultrasonics, Berlin, Germany (1995)

Recipient of Acoustical Society of America Award for Best Magazine Article on Acoustics by a Professional, December, 1995

Member, International Commission on Acoustics, 1996-1999

Vice President of the Acoustical Society of America (1995-96)

President of the Acoustical Society of America (1997-98)

Awarded Doctor Honoris Causa by the Universite Libre de Bruxelles, 1997

Elected Honorary Foreign Member of the National Academy of Sciences of the Bashkortostan Republic, 1998

Elected President of the Board of the International Commission on Acoustics, 1998

Awarded Helmholtz-Rayleigh Interdisciplinary Silver Medal, Acoustical Society of America, 2000

Honorary Visiting Professor of Chongqing University of Medical Sciences, 2002

Honorary Foreign Professor of the Faculty of Physics, M. V. Lomonosov  
Moscow State University, 2002

Awarded Distinguished Service Medal, Civilian Research and Development  
Foundation, July, 2005.

Awarded Outstanding Mentor Award of the Acoustical Society of America,  
2006.

**Professional Society Involvement:**

Journal Editorship: Editorial board of the Journal of Lithotripsy and  
Stone Disease (1990-1993)  
Editorial board of the journal Ultrasonics  
Editorial board of the Journal Ultrasonics Sonochemistry

Fellow: Acoustical Society of America  
American Institute of Ultrasound in Medicine

Member: American Association of Physics Teachers  
American Physical Society  
Sigma Xi

Chairman: Acoustical Society of America's Committee  
on Education in Acoustics, 1975-77; 81-83  
Acoustical Society of America's Search Committee for  
Executive Director, 1989-90

Member: Technical Committees on Physical Acoustics, Education  
in Acoustics and Long Range Planning, ASA  
Bioeffects Committee, American Institute of Ultrasound  
in Medicine  
American Institute of Physics (AIP) Committee on  
Education  
AIP Committee on Employment Statistics and Career  
Placement

Vice-President: Mississippi Association of Physicists, 1979

Reviewer: Journal of Acoustical Society of America  
Journal of American Institute of Ultrasound in Medicine  
Journal of Ultrasound in Medicine and Biology  
Journal of Chemical Physics  
Journal of Fluid Mechanics  
Journal of Urology  
Journal of Fluids Engineering  
Ultrasonics  
Ultrasonics Sonochemistry  
Science  
Nature

Research Proposals from NSF, NIH, and other agencies

**Business and Consulting Activities:**

Scientific Advisory Committee:

Focus Surgery, Inc.  
3940 Pendleton Way  
Indianapolis, IN 46226  
(Chair)

Therus Corporation  
2025 First Avenue  
Market Place Tower, Suite 1255  
Seattle, WA 98121  
(Member)

EKOS Corporation  
22122 20th Ave. SE, Suite 148  
Bothell, WA 98021  
(Member)

Board of Directors

Sonophysical Sciences, Inc.  
P.O. Box 3371  
Half Moon Bay, CA  
94019

China Medical Technologies  
No. 24 Yong Chang Bei Lu  
Beijing Economy & Technology Development  
Zone (Yizhuang)  
Beijing, 100176, China  
(Listed on NASDAQ as CMED)

Founder

UltraSound Technologies (UST)  
528 18th Avenue  
Seattle, WA

Crum, Kaminski and Larson  
528 18th Avenue  
Seattle, WA

Consultant:

Planning Systems, Inc.  
Naval Ordnance Station  
Naval Research and Development Activity

Naval Coastal Systems Center  
 Naval Surface Warfare Center  
 Mississippi Institute for Tech. Dev.  
 Verteq  
 Ney Ultrasonics  
 Sawtooth Sciences  
 Quest Integrated, Inc.  
 Focus Surgery  
 Boeing Corporation  
 3M Corporation  
 EKOS, LLC  
 Applied Precision, Inc.  
 Creare, Inc.  
 St. Jude Medical  
 UST, Inc.

### **Funding History:**

#### Active research projects:

<u>Year of award</u>	<u>Agency</u>	<u>Title</u>	<u>Award Amount</u>
2006-2010	Impulse Devices	Bubble Dynamics	\$1,186,597
2007-2011	NIH	Intraoperative Ac. Hemostasis	2,026,781
2006-2008	Marisla Foundation	Bubbles in Whales	100,000
2005-2008	ONR	Counter IED	550,000
2005-2006	CMT	HIFU Research	385,000
2005-2008	NIH	Fast 3-D imaging	437,000
2005-2009	DARPA	Autonomous Acoustic Hemostasis	21,285,251
2004-2009	NIH	ESWL	1,825,456
2005-2009	NIH	HIFU Tumor Treatment	3,348,700
2001-2008	NASA/NSBRI	Therapeutic Ultrasound	2,931,345
2001-2008	NASA/NSBRI	Project Team Leader	460,000
2000-2007	USAMRMC	Acoustic Hemostasis	8,935,671

#### Inactive research projects:

2000-2006	NASA	Buoyancy and SL	325,000
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2004-2005	NIH	High Speed Camera	356,745
2000-2005	NIH	Tissue Damage in ESWL	238,456
2001-2004	NIH	Contrast Agent Studies	1,241,870
2001-2004	CRDF	Nonlinear Acoustics	43,571
2001-2002	Point Biomedical	Contrast Agent Research	65,376
1996-2003	DARPA	Enhancing Sonoluminescence	2,354,187
1998-2001	FIRCA	Research Collaboration with Moscow State Univ.	90,000
1997-2000	CRDF	Nonlinear Acoustics	45,321
1998-2003	NIH	ESWL	1,613,715
1998-1999	NIH/FSI	Acoustic Hemostasis	25,291
1996-1998	ARPA	Hand-Held Scanner	12,638,346
1996-2001	DARPA	Acoustic Hemostasis	10,000,000
1996-1999	DoE	Toxic Waste Disposal	787,342
1996-1997	WRF	Medical Ultrasound	100,000
1994-1997	NSF	Sonoluminescence	542,887
1995-1998	NRL/ONR	Shallow Water Bubbles	1,432,200
1996-1997	WTC	Ultrasound Drug Therapy	200,000
1997-1998	NATO	Sonochemistry Workshop	102,987
1994-98	NIH	Extracorporeal Shock Wave Lithotripsy	787,000
1995-98	FIRCA	Research Collaboration with Moscow State Univ.	90,000
1993-1996	ONR	Sonoluminescence	143,000
1993-96	ONR	Synchronous Picosecond SL	79,000
1993-94	NSMRL	Low Frequency Bioeffects	79,000
1993-1995	NSWC	MHD Noise	10,000



1993-1995	CSS	Vapor Bubble Dynamics	196,000
1992-1995	NRL	Bubble Cloud Scattering	223,000
1993-1994	APL	Sonoelasticity	79,000
1993-1994	UW	Research Equipment	23,000
1989-92	NIH	Diagnostic Ultrasound	297,550
1990-91	ONR/AEAS	Bubble Related Effects in Sea Surface Scattering	350,000
1990-91	ONT	Bubbles and Water Jets	240,000
1990-91	ONR	Bubble-Related Ambient Noise in the Ocean	380,000
1989-91	International Paper	Industrial Research	41,000
1989-91	Swiss Medical Endodontics	Acoustics in Endodontics	10,000
1990-91	David Taylor Research Center	Acoustics of Bubble Screens	300,000
1989-90	ONR/AEAS	Bubble-Related Effects in Sea Surface Scattering	300,000
1989-90	ONR	Bubble-Related Ambient Noise in the Ocean	324,680
1989-90	ONT	Bubble Entrainment by Liquid Jets	200,000
1988-89	ONR	Acoustic Cavitation Research Program	350,000
1986-89	ONR	Bubble related ambient noise in the ocean	518,500
1988-89	AM Technologies	Cavitation threshold measurements	8,450
1986-88	MRC (UK Medical Research Council)	Acoustic cavitation developed by clinical ultrasound	23,320
1985-88	ONR	Nonlinear bubble dynamics	202,350

		and chaos	
1985-88	NIH	Risk assessment of therapeutic and diagnostic ultrasound	231,600
1988	NORDA	Acoustic levitation studies	5,200
1985-86	NSF	Acoustic cavitation produced by medical ultrasound devices	20,750
1985-86	Fulbright Commission	A group study of medical ultrasound risk assessment	8,500
1985-87	NSF	Equipment for study of nonlinear bubble dynamics	24,700
1984-86	NSF	US-Italy cooperative science project on noise produced by pulsating gas bubbles	5,400
1984-86	HHS	Acoustic cavitation produced by short acoustic pulses	31,300
1983-86	NSF	Nonlinear oscillations of gas and vapor bubbles in liquids	142,400
1982-85	NATO	Travel support for collaboration with Italian colleague	5,230
1983-85	ONR	Nonlinear bubble dynamics	48,500
1980-83	ONR	Optoacoustic sound generation in liquids	100,000
1979-82	NSF	Nucleation and stabilization of microbubbles in liquids	147,300
1981	NSF	Equipment for radiation induced cavitation studies	24,380
1977-80	ONR	Acoustic cavitation in liquids	75,130
1977-78	SRC (UK Science Research Council)	Thermally induced in- stabilities in human erythrocytes	21,000
1974-77	ONR	Gas bubble oscillations	45,000

		in liquids	
1973-74	ONR	Research Professorship	25,916
1973-74	ONR	Cavitation conference	4,200
1972-73	Naval Sea Systems Command	Microbubble generation	4,500
1971-74	Naval Ordnance Station	Liquid monopropellant ignition by acoustic cavitation	18,000
1969-73	Naval Academy Res. Council	Acoustic levitation studies of liquid droplets	28,000
1971-73	NSF	Summer institutes in physics: lecture demonstrations for college physics teachers	134,780
1968-71	ONR	Acoustic force on liquid droplets in a sound field	45,800

#### University Service (Various Universities):

##### Committee membership:

Radiation Safety Committee (1980-85)  
 Dean of Liberal Arts Committee on Teaching Excellence (1983)  
 Premed Advisory Committee (1980-present)  
 Faculty Senate (1987-1989)  
 University Research Board (1990 - 1993)  
 COFS College Council (1997-1999)

##### Committees chaired:

Dean of Liberal Arts Search Committee  
 Department of Curriculum and Instruction Five Year Review Committee  
 Advisory Committee, Dean of Liberal Arts

##### Department service:

Nearly every major committee in department

##### Principal Efforts:

BA in physics for premed majors  
 Graduate student recruitment

Graduate curriculum committee  
Faculty search committees  
Undergraduate teaching aids

Research Recognition:

My research has been highlighted in the following popular magazines:

- "Ultrasound Safety and Collapsing Bubbles", Science News **130**, 372 (1986).
- "The fascinating physics of fizz", U.S. News and World Report, Nov. 20, 1989.
- "Noise at sea: Cries of infant microbubbles", Science News, **138**, 341 (1990).
- "The life and death of bubbles", Johns Hopkins Magazine, December, 1990.
- "Tiny bubbles explain the babble of undersea noise", New York Times, December 11, 1990.
- "Bubble light in the blink of an eye", Science News, **139**, 292 (1991).
- "Singing in the Rain," Omni Magazine, **13**, 28 (1991).
- "Flashes might yield clues about fusion," Wall Street Journal, Oct. 14, 1991.
- "Light comes from ultrasonic cavitation in picosecond pulses," Physics Today, November, 1991, pp. 17-18.
- "Sonoluminescence," Washington Post, August 12, 1991.
- "Using sound to disarm still-deadly mine fields", New York Times, June 8, 1994.
- "Flashes of light", Dallas Morning News, Nov.21, 1994, p. 6D
- "Making light of sound in solitary bubbles", Science News, **146**, 247 (1994).
- "Can sound drive fusion in a bubble?", Science, **266**, 1804 (1994).
- "Ultraschall bringt Molekule zum Leuchten", VDI Nachrichten, 17 February, 1995.
- "Inferno in a Bubble", Science News, **147**, 266-267 (1995).
- "Tapping the Light Fantastic, 21st Century, pp 48-53, Summer, (1995).
- "Wave of excitement", The (London) Guardian, May 27, 1995.
- "Bones to Bridges", The Columbian (Vancouver, WA), Oct. 25, 1995.
- "Sonoluminescence, applications featured at SCCM Meeting", APS News, November, 1995.
- "Inspiring flashes", The (London) Economist, pp. 102-103, 23 December 1995.
- "Ultrasound technology eyed as way to stop internal bleeding", R & D Magazine, January, 1996, p. 74.
- "Scientists developing portable ultrasound", Las Vegas Review Journal and Sun, March 10, 1996
- "Sound waves may help stop internal bleeding", The (London) Sunday Times, April 21, 1996
- "The physics in Chain Reaction", Science in Action, BBC World Service, Radio Broadcast, 15 August 1996
- "Getting Defensive", Columns, The University of Washington Alumni Magazine, Sept. 1996, pp.22-26.
- "The spell of sonoluminescence", Science, Research News, Vol. 274, 718-719 (1996).
- "Mysterious Light from Tiny Bubbles Finds Practical Uses", New York Times, Dec. 31, 1996.
- "Bloodless Surgery", Popular Mechanics, January, 1997, pp 49-51.
- "The Mystery of Sonoluminescence", San Diego Tribune-Union, Jan. 8, 1997.
- "Livermore lab blowing bubbles for atomic study", San Francisco Examiner, Feb 16, 1997.

"Ultrasonen geluidsgolven: Nieuwe stille kracht in waterzuivering" and Cover Photo in Het Ingenieursblad, August/September, 1997, pp.22-32.

"Bubble, bubble, toil and trouble", The Guardian, 22 January 1998.

"Bloodless Surgery with Sound", ABC NEWS.COM (June 23, 1998).

"Ultrasound prevents blood loss in surgery", Science News., (June 27, 1998).

"A Wave of the Future", Dallas Morning News, June 29, 1998.

"New focus in surgery appears to be sound", Seattle Post-Intelligencer, June 24, 1998.

"Scientists making strides in 'bloodless' surgery", Tulsa World, June 28, 1998.

"Bloodless surgery may be on the way", The Herald, June 25, 1998.

"The next 50 years in medicine", BBC Radio 4, July 2, 1998.

"Sound Effects", Newsday, July 21, 1998.

"Ultrasound surgery a bloodless operation", Roanoke Times, June 25, 1998.

"Of seas and surgeries", Physics World, August, 1998.

"Ultrasound goes where scalpels can't", Prevention Mag., Nov. 1998, p. 152.

"New ultrasound therapies emerge", The Industrial Physicist, Sept. 1998, p. 30.

"Bloodless surgery: ultrasound cleans up operations", The Lancet, 31 Oct. 1998.

"Noninvasive Ultrasonic Surgery Advances", MedPro Month, pp.306-307, Dec. 1998.

"Scientists dissect the Star in a Jar", MSNBC, April 1, 1999.

"Mit Ultraschall Krebszellen 'kochen'", Interview on German National Television concerning acoustic hemostasis, 1 September, 1999.

"The sound of snow", New Scientist, 25 December 1999.

"The sound of snowflakes", Nature News Update, 29 October 1999.

"Snow Screeching on Water", Physics News Update, 25 January 2000.

"Snow makes noise—in water", the Kansas City Star, the St. Paul Pioneer Press, the San Jose Mercury and the Montreal Gazette, January 27, 2000.

"The underwater sounds of snowfall", National Public Radio, Weekend Edition with Scott Simon; 19 February 2000.

"Silent Sounds", BBC, World Service, 11 March 2000.

"Ultrasound halts bleeding", BBC World Service, 31 May 2000.

"Silent snowfall: Forget it", Rocky Mountain News, 13 March 2000.

"Snow makes underwater racket", Discovery.Com, 13 March 2000.

"White noise", The Sciences, May/June, 2000, p. 9.

"It's a cold world: Flakes are full of sound and flurry", The San Diego Union-Tribune, 12/20/00.

"Beyond Imaging", Science News, Vol. 159, pp. 12-13 (Jan, 2001).

"Taking a flight with NASA", The Tacoma News Tribune; 5 March 2001.

"Cancer device heads to England", China Daily, 14 May 2001.

"UW joins effort to advance space biomedical technology", Northwest Science and Technology, Autumn, 2001 (pp. 6-8).

"Star in a Jar—The Hot Sound of Sonoluminescence", Odyssey Magazine, September, 2001, pp 15-18.

"Sound waves stop bleeding—Technology worth watching", Financial Times (London), Nov. 22, 2001, p. 15.

"EKOS evolves out of chance overseas meeting", Puget Sound Business Journal, April 20, 2001.

"Sound waves beat the knife", The Economist, December 8, 2001 U.S. Edition.

"Sound waves stop bleeding: Technology worth watching", Financial Times (London), Nov. 22, 2001.



"UW 'bloodless surgery' project crucial in wartime", Seattle Times, Dec. 12, 2001.

"Baby scan machine may save crash lives", Scottish Daily Record and Sunday Mail, 12/9/01, p. 21.

"Penetrating the Blood-Brain Barrier", Voice of America News, 3 January 2002.

"Tabletop fusion report elicits mixed reaction", Washington Post, 3/5/02, p. A1.

"Was there fusion in 'tabletop' test?", Toronto Star, 3/5/02, p. A19.

"Oak Ridge's claim of fusion ignites not-unexpected doubt", Commercial Appeal (Memphis), 3/5/02, p. A7.

"Nuclear fusion claim leaves scientist cold", Los Angeles Times, 3/5/02.

"Bubble Fusion", National Public Radio, All Things Considered, 3/6/02.

"Bubble Fusion: Fact or Fiction", Physics World, April, 2002, p. 5.

"Skepticism greets claim of bubble fusion", Physics Today, April, 2002, p. 16.

"Is It Really Fusion This Time?", Business Week, March 18, 2002.

"Ultrasound research could lead to bloodless surgery", Fort Worth Star-Telegram, June 17, 2002

"Embracing, crystalline silence of snowfall", Washington Post, January 19, 2002.

"Is it real this time?", New York Times, 3 March 2004

"Knifeless surgery kills cancer with sound", UPI Science News, 2/15/2004

"Blasts might harm whales, studies say", San Diego Union Tribune, November 22, 2004.

"Pop--rumors of bubble fusion", New Scientist, 22 January 2005

"Brutal Bubbles", Science News, March 5, 2005

"Tiny bubbles implode with the heat of a star", Tuesday, Mar. 15, 2005, *The New York Times*

"Mars or Bust", Science News Online, Nov. 26, 2005; Vol. 168, No. 22.

"Thermonuclear Squeeze", Science News, Jan. 21, 2006, Vol. 169, p. 38.

"Tabletop fusion research under review", Washington Post, March 9, 2006.

"Bubble fusion research under scrutiny", IEEE Spectrum, May 2006.

"Ultrasound to treat war wounds", BBC World Service, 27 June 2006

"Philips to treat war wounds", Red Herring Website, 20 July 2006

"Philips Leads DARPA Development Project for an Ultrasound Device to Stem Bleeding and Save Lives on the Battlefield", [finanzen.net/news](http://finanzen.net/news), 20 July 2006

"Battlefield device to stop internal bleeding", Journal of Emergency Medical Services, December 2006, p. 27.

"The Ultrasonic Tourniquet", Esquire Magazine's Invention of the Year (2006), December 2006, Volume 146, Issue 6

#### **Service on National and International Committees:**

American Institute of Physics Committee on Education and Employment Statistics (1988-94); American Institute of Physics Committee on Committees (1994-00) (Chair, 1998); American Institute of Physics Committee on Physics Today (1996-02); International Commission for Acoustics (1996-02; Chair, 1998-); International Union of Pure and Applied Physics (1998- ); International Union of Theoretical and Applied Mechanics (1998- ); American Institute of Physics, Governing board (1999-02; Executive Committee-2000-2001); Chair, AIP Physics Resources Policy Committee

**Patents:**

- "Methods and Devices for Providing Acoustic Hemostasis", U. S. Patent No. 5,882,302; EU Patent No. 97941317.6-2305
- "Devices for Producing Acoustic Hemostasis", U. S. Patent No. 5,993,389
- "Methods and devices for providing acoustic hemostasis", U. S. Patent Number 6,083,159
- "Method and apparatus for medical procedures using high-intensity focused ultrasound" U. S. Patent No. 6,007,499
- "Method and apparatus for medical procedures using high-intensity focused ultrasound" U. S. Patent No. 6,315,741
- "Method and apparatus for medical procedures using high-intensity focused ultrasound" U. S. Patent No. 6,432,067
- "Drug Delivery Devices, and Methods of Use", U. S. Patent Number 6,444,217
- "A process for Bloodless Surgery Using Ultrasound Energy", (application)
- "Method of Making Metal Matrix Composites", (application No. 09/616,589)
- "Enhanced Transport using Membrane Disruptive Agents", (Canadian application No. 2,317,549)
- "Noise-free real time ultrasonic imaging of a treatment site undergoing high intensity focused ultrasound therapy", U. S. Patent 6,425,867
- "Methods and Devices for the Treatment of Gastrointestinal Bleeding using Ultrasound", (application)
- "Use of contrast agents to increase the effectiveness of high intensity focused ultrasound therapy", U. S. Patent 6,716,184
- "Ultrasound therapy head configured to couple to an ultrasound imaging probe to facilitate contemporaneous imaging using low intensity ultrasound and treatment using high intensity focused ultrasound", U. S. Patent 6,716,184
- "Enhanced transport using membrane disruptive agents", U. S. Patent No. 6,835,393
- "Treatment of unwanted tissue by the selective destruction of vasculature providing nutrients to the tissue" Application No. 11/207,554
- "Method and Apparatus for Preparing Organs and Tissues for Laparoscopic Surgery", Provisional patent application, filed 11 August, 2005
- "Applications of High Intensity Focused Ultrasound in Obstetrics and Gynecology", Application No. 10/977,339

## **Research Publications :**

### **I. Books (edited)**

Therapeutic Ultrasound, Proceeding of the 2<sup>nd</sup> International Symposium, M. A. Andrew, L. A. Crum and S. Vaezy, eds (American Institute of Physics Press), pp. 71-75 (2003).

The Sound of the Future: A Global View of Acoustics in the 21st Century, (Proceedings of the 16th International Congress on Acoustics and the 135th meeting of the Acoustical Society of America), P. K. Kuhl and L. A. Crum, eds., (American Institute of Physics: New York), 1998, pp. 3042.

Sonochemistry and Sonoluminescence, L. Crum, T. Mason, J. Reisse, and K. Suslick, eds., NATO ASI Series, Vol. 524 (Kluwer Academic Publishers: Dordrecht), 1999.

### **II. List of Papers Read before Professional Organizations**

#### **A. Invited presentations:**

- I. "Lecture Demonstrations in Sound," E.R. Pinkston and L.A. Crum, J. Acoust. Soc. Amer. **24**, 281 (A) (1973).
2. "Bjerknes Forces Between Two Pulsating Air Bubbles in a Liquid," L.A. Crum, J. Acoust. Soc. Amer. **24**, 324 (1973).
3. "Lecture Demonstrations in Physics -- A Report on the 1973 NSF Short Course," presented at the November meeting of the Southeastern Section, Amer. Phys. Soc., Winston-Salem, NC (1973).
4. "Cocktail Party Acoustics," L. A. Crum, J. Acoust. Soc. Amer. **57**, S20 (A) (1975).
5. "Lecture Demonstrations in Acoustics," presented at the summer meeting of the ASEE, Fort Collins, CO, June (1975).
6. "Acoustic Levitation, A Useful Experimental Technique," L. A. Crum, J. Acoust. Soc. Amer. **60**, S21 (1976).
7. "Some Suggested Lecture Demonstrations in Acoustics," presented to the March meeting of the Narragansett Section of the Acoustical Society of Amer. March (1976).
8. "Cyclic Liquid Jet Behavior in Pulsating Bubbles," presented at the Conference on Acoustic Cavitation, Bournemouth, England, December (1977).
9. "Some Effects of Heat on Red Blood Cell Morphology," with T. Coakley presented at the Conference on Hyperthermia in London, England, May (1978).
10. "The Effect of Moderate Sound Fields on Air Bubbles," presented to the Washington, DC Chapter of the Acoustical Soc. of Amer. Washington, DC (1968).



11. "Why Not Acoustics?" presented to the Chesapeake Section, American Association of Physics Teachers, Annapolis, MD, 1969, by request of the Committee of Education in Acoustics of the Acoustical Society of America.
12. "Lecture Demonstrations in Physics -- An NSF Summer Short Course," D. R. Carpenter, R. Clark, W. Hilton, M. McCay, and D. Nordling, presented to the Southeastern Section of the American Physical Society, Columbia, SC (1971).
13. "Lecture Demonstrations in Physics -- A Short Course," with J. Davis, presented at the National Science Teacher's Association annual meeting, Atlanta, GA, March (1979).
14. "Heterogeneous Nucleation," presented at the Conference on Ultrasonics in Biophysics and Bioengineering, Allerton House, University of Illinois, IL, June (1979).
15. "Acoustic Cavitation Inception in Water," presented at the Conference on Inhomogeneities in Underwater Acoustics, Göttingen, West Germany, July (1979).
16. "Nucleation and Stabilization of Microbubbles in Liquids," presented at the International Symposium on the Physics of Air Bubbles in Liquids, sponsored by the IUTAM, Pasadena, CA, June (1981).
17. "Nonlinear Oscillations of Gas Bubbles in Liquids," Symposium on the Physics of Bubbles in the Ocean, sponsored by the National Research Council and supported by the Office of Naval Research, Washington, DC, May (1983).
18. "Nucleation Studies in Water and Other Liquids," presented at the Special Satellite Conference of the Undersea Medical Society, Buffalo, NY, October (1983).
19. "Acoustic Cavitation," presented as the "President's Lecture" at the 1982 IEEE International Ultrasonic Symposium, San Diego, CA, October (1982).
20. "Some Recent Topics in Physical Acoustics," L. A. Crum, Review paper for Special Session on "Applications of Physics," presented at the general meeting of the American Physical Society, Washington, DC, April (1984).
21. "Cavitation by Short Acoustic Pulses," with J.B. Fowlkes, Presented at Ultrasonics International, London, England, July, (1985).
22. "Biological Effects of Acoustic Cavitation," with W. Nyborg, H. Flynn and E. Carstensen, a short course presented at the University of Rochester, NY, May (1985).
23. "Application of the Apple Computer for Classroom Demonstrations and Laboratory Experiments," with L. Bolen, Jr., presented at the 110th Meeting of the Acoustical Society of America, Nashville, TN November (1985).
24. "Cavitation and Medical Ultrasound," presented at the International Conference on Ultrasound in Medicine, Bath, England, April (1986).

25. "Acoustic Cavitation Produced *in vitro* by Clinical Ultrasound Devices," presented at the 12th International Congress on Acoustics, Toronto, Canada, July (1986).
26. "Acoustic Cavitation in Liquids," presented at the 11th International Symposium on Nonlinear Acoustics, Novosibirsk, USSR, August (1987).
27. "Noise Produced by Spray," presented at NATO sponsored conference on Ambient Noise in the Ocean, La Spezia, Italy, June (1987).
28. "Is acoustic cavitation produced by diagnostic ultrasound devices," presented at the IEEE Sonics and Ultrasonic Symposium, Denver, CO, October (1987).
29. "Efficacy of ultrasonic endodontic unit in disruption of bacteria," with M. Ahmad, presented at International Association for Dental Research, New Delhi, India, January (1988).
30. "Acoustic cavitation and ESWL," presented at the International Conference: Basic and Technical Aspects of Lithotripsy, in Gainesville, FL, March (1988).
31. "Mechanisms for stone disintegration in ESWL," presented at the Allerton House meeting on acoustic lithotripsy, University of Illinois, IL, May (1988).
32. "Cavitation microjets as a contributing mechanism for stone disintegration in ESWL," presented at the Spring meeting of the Acoustical Society of America, Seattle, WA, May (1988).
33. "Acoustic cavitation and medical ultrasound," presented as a plenary lecture for Ultrasonics International 1989, Madrid, Spain.
34. "Acoustic cavitation and medical ultrasound", presented at the 13th International Congress on Acoustics, Belgrade, July (1989).
35. "Sonoluminescence and its application to medical ultrasound risk assessment" with D.F. Gaitan presented at the International Society for Optical Engineering, San Diego, CA, August, (1989).
36. "Mechanisms of stone disintegration and tissue damage by extracorporeal shock wave lithotripter", with C.C. Church, presented at Annual Meeting of the American Association of Physicists in Medicine, Memphis, TN, July, (1989).
37. "Demonstrations of underwater noise generation by bubbles", with H.C. Pumphrey, presented at the Spring meeting of the Acoustical Society of America, Syracuse, NY, May, (1989).
38. "Underwater noise due to precipitation", with H.C. Pumphrey, A. Prosperetti and L. Bjorno, presented at the Spring meeting of the Acoustical Society of America, Syracuse, NY, May, (1989).
39. "Acoustic Cavitation generated by Extra Corporeal Shock Wave Lithotripsy", with C.C. Church, presented at the 3rd Drexel Symposium on Medical Ultrasound, Philadelphia, PA, September, (1989).

40. "The potential role of acoustic cavitation in medical ultrasound bioeffects, with R.A. Roy and C.C. Church, presented at 118th meeting of the Acoustical Society of America, St. Louis, MO, November, (1989).
41. "Effectiveness of some physical mechanisms generated by the ultrasonic file in the disruption of root canal bacteria", L.A. Crum and M. Ahmad, presented at the International Association for Dental Research, New Delhi, India, July, (1989).
42. "Acoustic cavitation and medical ultrasound", presented at the 2nd World Congress on Ultrasound in Developing Countries, Kuala Lumpur, Malaysia, November, (1989).
43. "Bubbles in the Body: Cavitation and Medical Ultrasound", with R.A. Roy and C.C. Church, presented in special session on "Frontiers in Physical Acoustics", American Association for the Advancement of Science, New Orleans, LA, February, (1990).
44. "Acoustic cavitation and diagnostic ultrasound", with R. A. Roy, and C. C. Church, presented at a special session on ultrasonics at the Annual Meeting of the American Association of Physicists in Medicine, St. Louis, July, 1990.
45. "Bubble-related sources of sea-surface sound", with R. Roy, S. Yoon, A. Kolaini, and M. Nicholas, presented at a special session on acoustical oceanography at the 119th meeting of the Acoustical Society of America, San Diego, CA, November, 1990.
46. "Bubble-related ambient noise in the ocean", presented as a special lecture at the Scandinavian Acoustics Cooperation Meeting, Ustaoset, Norway, 27-30 January (1991).
47. "Collective bubble oscillations as a possible low frequency sound source", presented at ONR workshop on Low Frequency Sound Sources, Austin, TX; March, (1991).
48. "Some recent studies in spark-discharge sources using an experimental lithotripter", with C. Church, presented at ONR Workshop on Low Frequency Sound Sources, Austin, TX, March (1991).
49. "Low frequency noise generated by transient and steady-state bubble clouds", with R. Roy, presented at Air-Sea Interaction Meeting, Victoria, British Columbia, March (1991).
50. "ESWL and cavitation bubble dynamics, with C. C. Church and S. M. Cordry, presented at the Fall Meeting of the Acoustical Society of America, Houston, TX, October (1991).
51. "Acoustic cavitation from diagnostic ultrasound", with R. E. Apfel, C. K. Holland and R. A. Roy, presented at the Spring Meeting of the Acoustical Society of America, Salt Lake City, UT, April (1992).
52. "Sonoluminescence," L. A. Crum and D. F. Gaitan, presented at the 14th meeting of the International Congress on Acoustics, Beijing, China, September (1992).

53. "Hot topics in physical acoustics", presented at the Fall Meeting of the Acoustical Society of America, Denver, CO, September (1993).
54. "Origins of single bubble sonoluminescence", presented at the International Union of Theoretical and Applied Mechanics Symposium on Cavitation and Bubble Dynamics, Birmingham, England, September (1993)
55. "Lecture demonstrations in acoustics", with A. Atchley, R. Keolian, L. Bolen, M. Korman, et al., presented at the Fall Meeting of the Acoustical Society of America, New Orleans, LA, October (1992).
56. "Underwater acoustic backscatter from a cylindrical bubble cloud," with S. W. Yoon and K. J. Park, presented at the 14th meeting of the International Congress on Acoustics, Beijing, China, September (1992).
57. "The role of bubbles in ocean ambient noise", presented at the Third Sea Surface Sound Symposium, Lake Arrowhead, CA, March (1994).
58. "Single bubble sonoluminescence", presented at the Fifth Western Pacific Regional Acoustics Conference, Seoul, Korea, 23-26 August, 1994.
59. "Sonoluminescence", with S. Cordry, presented at the 128th meeting of the Acoustical Society of America", Austin, TX, November (1994).
60. "Hot topics in acoustical oceanography", with M. J. Buckingham, presented at the 128th meeting of the Acoustical Society of America, Austin, TX, November (1994).
61. "15 minutes of chaos", with M. S. Korman, presented at the 129th meeting of the Acoustical Society of America", Washington, DC, May (1995).
62. "Single bubble Sonoluminescence", Plenary paper presented at the Conference of the American Physical Society Topical Group on Shock Compression of Condensed Matter, Seattle, WA, August (1995).
63. "Theoretical modeling of the acoustic pressure field produced by commercial lithotripters", with M. Averkiou and M. Hamilton, presented at the 130th meeting of the Acoustical Society of America, Indianapolis, IN, December (1995).
64. "Popcorn and the role of acoustic cavitation in HIFU surgery", presented at the 130th meeting of the Acoustical Society of America, Indianapolis, IN, December (1995).
65. "Shock wave lithotripsy: A demonstration of experimental methods for *in vitro* shock wave exposure and analysis of cell injury", with J. McAteer, S. Andreoli, A. Evan, D. Denman, C Mallett, R. Cleveland, M. Averkiou, J. Lingeman and D. Lifshitz, presented at the 131st meeting of the Acoustical Society of America, Indianapolis, IN, December (1995).
66. "Sonoluminescence--History and present stâtus", L. A. Crum, Plenary Paper presented at the World Congress on Ultrasonics, Berlin, September (1995).



67. "The role of acoustic cavitation in megasonic cleaning", presented at Forum Acusticum, Antwerpen, Belgium, 1-4 April (1996).
68. "'Popcorn'--and the role of acoustic cavitation in HIFU surgery", presented at the 131st meeting of the Acoustical Society of America, Indianapolis, IN, May (1995).
69. "Acoustic cavitation and implosion acoustics", presented at the 132nd meeting of the Acoustical Society of America, Honolulu, HI, December (1996).
70. "Therapeutic ultrasound: A promising future in clinical medicine", with M. Bailey, P. Kaczkowski, I. Makin, P. Mourad, K. Beach, S. Carter, U. Schmiedl, W. Chandler, R. Martin, S. Vaezy, G. Keilman, R. Cleveland, and R. Roy, presented at the 16th International Congress on Acoustics and the 135th Meeting of the Acoustical Society of America, Seattle, June (1998).
71. "Acoustically induced cavitation fusion", presented at the 16th International Congress on Acoustics and the 135th Meeting of the Acoustical Society of America, Seattle, June (1998).
72. "Sonoluminescence: Current status and future perspectives", L. A. Crum and T. J. Matula, Presented at the 137 meeting of the Acoustical Society of America, Berlin (March, 1999).
73. "Effect of increased ambient pressure on lithotripsy-induced cavitation in bulk fluid and at solid surfaces", M. R. Bailey, R. O. Cleveland, O. A. Sapozhnikov, J. A. McAteer, J. C. Williams and L. A. Crum, Presented at the 137 meeting of the Acoustical Society of America, Berlin (March, 1999).
74. "Acoustic Hemostasis", L. A. Crum, et al., Presented at the 137 meeting of the Acoustical Society of America, Berlin (March, 1999).
75. "Recent developments in biomedical ultrasound", L. A. Crum, Presented at the 140<sup>th</sup> meeting of the Acoustical Society of America, Newport Beach (December, 2000).
76. "Acoustic Hemostasis", L. A. Crum, presented at the 2001 IEEE Ultrasonics Symposium, Atlanta, October, 2001.
77. "High Intensity Focused Ultrasound for arrest of bleeding", S. Vaezy, R. Martin and L. A. Crum, presented at the 142<sup>nd</sup> meeting of the Acoustical Society of America, Fort Lauderdale, December (2001).
78. "Bubbles and acoustic image-guided HIFU", M. Bailey, S. Vaezy, J. C. Yuen, A. Anan, N. A. Miller, P. J. Kaczkowski and L. A. Crum, presented at the 142<sup>nd</sup> meeting of the Acoustical Society of America, Fort Lauderdale, December (2001).
79. "Sonoluminescence", L. A. Crum and T. Matula, Presented at The 47th International Symposium on Optical Science and Technology (SPIE), Seattle, (July, 2002).
80. "Therapeutic Ultrasound", L. A. Crum, Plenary Lecture presented at the 18<sup>th</sup> International Congress on Acoustics, Kyoto, Japan (April, 2004).

81. "Fast, dynamically adaptive algorithm for nonlinear acoustics and high intensity focused ultrasound modeling in biological tissue", F. P. Curra, S. G. Kargl, and L. A. Crum, presented at the 18<sup>th</sup> International Congress on Acoustics, Kyoto, Japan (April, 2004).
82. "Cavitation in shock wave lithotripsy", M. R. Bailey, L. A. Crum, O. A. Sapozhnikov, A. P. Evan, J. A. McAteer, T. Colonius and R. O. Cleveland, presented at the 146<sup>th</sup> Meeting of the Acoustical Society of America, Austin, TX (October, 2003).
83. "Generation of shear waves as an effective mechanism of dynamic load of the lithotripter shock wave on the kidney stone", O. A. Sapozhnikov, R. O. Cleveland, M. R. Bailey and L. A. Crum, presented at the 146<sup>th</sup> Meeting of the Acoustical Society of America, Austin, TX (October, 2003).
84. "Mechanisms of action in dual-pulse lithotripsy", D. L. Sokolov, M. R. Bailey and L. A. Crum, presented at the 146<sup>th</sup> Meeting of the Acoustical Society of America, Austin, TX (October, 2003).
85. "Therapeutic Ultrasound", L. A. Crum, presented at a meeting on Advanced Metrology for Ultrasound in Medicine, Teddington, UK, April (2004).
86. "The relative effects of cavitation and nonlinear ultrasound propagation on the dynamics of thermal lesion development in a tissue phantom", V.A. Khokhlova, M.R. Bailey, J. Reed, P.J. Kaczkowski, and L. A. Crum, presented at the 15<sup>th</sup> International Symposium on Nonlinear Acoustics (Moscow: July, 2004).
87. "Therapeutic Ultrasound", L. A. Crum, presented at the 47<sup>th</sup> Annual Meeting of the American Association of Physicists in Medicine, (Seattle, Washington: July, 2005).
88. "Applications of nonlinear acoustic to medical ultrasound", Lawrence A. Crum, Vera A. Khokhlova and Oleg A. Sapozhnikov, presented at a meeting of Nonlinear Physics in the 21<sup>st</sup> Century, (Moscow, Russia: July, 2005).
89. "Some medical applications of acoustic streaming", Lawrence A. Crum, presented at the 149<sup>th</sup> meeting of the Acoustical Society of America, Vancouver, BC (May, 2005).
90. "Occlusive thrombosis in the rabbit auricular vein *in vivo* targeted by induction of intraluminal cavitation using HIFU and ultrasound contrast agent", Andrew Brayman, Juan Tu, Thomas Matula, Joo Ha Hwang, Michael Kimmey and Lawrence A. Crum, presented at the 149<sup>th</sup> meeting of the Acoustical Society of America, Vancouver, BC (May, 2005).
91. "Hyperechogenicity during high intensity focused ultrasound", Lawrence Crum, Michael Bailey, Brian Rabkin, Vera Khokhlova and Shahram Vaezy, presented at the 150<sup>th</sup> meeting of the Acoustical Society of America, Minneapolis, MN (October, 2005).
92. "HIFU echogenicity: Is it mechanical or thermal?", Lawrence A. Crum, Michael Bailey, Brian Rabkin and Shahram Vaezy, Presented at the 5<sup>th</sup> International Symposium on Therapeutic Ultrasound, Boston, MA (September, 2005).

B. Contributed presentations:

1. "Study of Molecular Association in Aqueous Solutions of Carboxylic Acids by Ultrasound," L. A. Crum and F.B. Stumpf, Bul. Am. Phys. Soc. **10**, 636 (A) (1965).
2. "Measurements of the Interaction Radiation Impedance of Sonar Array Elements at an Air-Water Interface," L. A. Crum and F. B. Stumpf, Bul. Am. Phys. Soc. **12**, 244 (A) (1967).□
3. "The Motion of Bubbles in a Moderate Sound Field," L.A. Crum and A.I. Eller, J. Acoust. Soc. Amer. **44**, 369 (A) (1968).□
4. "The Acoustic Force on a Liquid Droplet in a Stationary Sound Field," L.A. Crum, J. Acoust. Soc. Amer. **47**, 82 (A) (1970).□
5. "Variation of the Cavitation Threshold of Water with Surface Tension," L.A. Crum, J. B. Gallemler and D. A. Nordling, J. Acoust. Soc. Amer. **52**, 151-152 (A) (1972).
6. "The Effect of Surface Tension on the Threshold for Rectified Diffusion," L. A. Crum, J. Acoust. Soc. Amer. **57**, S57 (A) (1975).□
7. "Fragmentation of Heated Erythrocytes," with W.T. Coakley, presented at 6th International Biophysics Conference in Kyoto, Japan, September (1978).
8. "Liquid Jet Production in Pulsating Air Bubbles," paper delivered to the 8th International Symposium on Non-linear Acoustics, Paris, France, July (1978).
9. "Wave Development in Heated Human Erythrocytes," with W. T. Coakley, presented at Fall meeting of Acoustical Society of America, November (1978).
10. "Instability Growth on Biological Membranes," with W.T. Coakley, Bioacoustics Discussion Meeting, London, England, July (1979).
11. "The Pulsation Amplitude of Gas Bubbles in a Stationary Sound Field," with C. Herring and D. Young presented at the 100th meeting of Acoustical Society of America, Los Angeles, CA, November (1980).
12. "Rectified Diffusion at Megahertz Frequencies," with G. Hansen, presented at 101st meeting of Acoustical Society of America, Ottawa, Canada, May (1981).

13. "Air Bubble Growth in Guinea Pig Tissue by Rectified Diffusion," with G. Hansen, and presented at the spring meeting of the Acoustical Society of America, Chicago, IL, April (1982).
14. "The Effect of Polymer Additives on the Acoustic Cavitation Threshold of Water," with J. Brosey, presented at the fall meeting of the Acoustical Society of America, Orlando, FL, November (1982).
15. "The Effect of Pulse Length on Transient Cavitation Inception," with R. Roy and J. Reidy, presented at the fall meeting of the Acoustical Society of America, Orlando, FL, November (1982).
16. "Nonlinear Oscillations of an Individual Gas Bubble Pulsating in a Liquid," with K. Commander, presented at the ONR Conference on the Physics of Bubbles in the Ocean, Washington, DC, May (1983).
17. "Deterministic Chaos in Nonlinear Oscillations of Gas Bubbles," with R.G. Holt and J. Reidy, presented at the 1984 Meeting of Mississippi Academy of Science, Biloxi, MS, February (1984).
18. "An Acoustic Levitation Technique for Calibrating Small Hydrophones," with J.B. Fowlkes and J. Reidy, presented at the 1984 meeting of Mississippi Academy of Science, Biloxi, MS, February (1984).
19. "Nonlinear Oscillations of an Individual Gas Bubble Pulsating in a Liquid," with K.W. Commander and J. Reidy, presented at the 1984 meeting of the Mississippi Academy of Science, Biloxi, MS, February (1984).
20. "The Effect of Dissolved Ion Concentration on the Acoustic Cavitation Threshold of Water," with A. Atchley and J. Reidy, presented at the Spring meeting of the Acoustical Society of America, Norfolk, VA, May (1984).
21. "Effect of Dilute Polymer Additives on the Acoustic Cavitation Threshold of Water," presented at the 7th Annual Energy Sources Technology Conference, New Orleans, LA, February (1984).
22. "Subharmonic Emissions from a Cavitating Bubble," with K. Commander and R. Holt, presented at the 108th meeting of the Acoustical Society of America, Minneapolis, MN, October (1984).
23. "Thermal Behavior of Bubbles in Large Amplitude Motion," with A. Prosperetti, presented at the 108th meeting of the Acoustical Society of America, Minneapolis, MN, October (1984).
24. "Cavitation from Short Acoustic Pulses," with J.B. Fowlkes, presented at the 108th meeting of the Acoustical Society of America, Minneapolis, MN, October (1984).
25. "Acoustic Cavitation Nucleation and Stabilization Mechanism," with A. Atchley, presented at the 108th meeting of the Acoustical Society of America, Minneapolis, MN, October (1984).



26. "Cavitation from Microsecond Length Acoustic Pulses," with J.B. Fowlkes, presented at the 109th meeting of the Acoustical Society of America, Austin, TX, April (1985).
27. "An Exact Formulation for the Internal Pressure of a Cavitation Bubble," with K. Commander and A. Prosperetti, presented at the 110th meeting of the Acoustical Society of America, Nashville, TN, November (1985).
28. "Acoustic Cavitation Generated by an Extracorporeal Shockwave Lithotripter," with M. Dyson, A. Coleman, J. Saunders, presented at the 112th meeting of the Acoustical Society of America, Anaheim, CA, December (1986).
29. "The Biological Significance of Ultrasonically Induced Cavitation," with M. Dyson and A. Mortimer, presented at the 112th meeting of the Acoustical Society of America, Anaheim, CA, December (1986).
30. "Ultrasonically Induced Gas Bubble Production in Agar Based Gels," with S. Daniels and G. R. ter Haar, presented at the 112th meeting of the Acoustical Society of America, Anaheim, CA, December (1986).
31. "Forced radial oscillations of single cavitation bubbles: A comparison of experimental and numerical studies," R. G. Holt and L. A. Crum, presented at 113th meeting of the Acoustical Society of America, Miami, FL, November (1987).
32. "Dependence on pulse parameters for free radical production by cavitation from short pulses of ultrasound," J.B. Fowlkes and L.A. Crum, presented at 113th meeting of the Acoustical Society of America, Miami, FL, November (1987).
33. "Underwater noise produced by rainfall," H.C. Pumphrey and L.A. Crum, presented at 113th meeting of the Acoustical Society of America, Miami, FL, November (1987).
34. "Experimental measurements of rectified diffusion in oscillating bubbles," R.G. Holt and L.A. Crum, presented at the 116th meeting of the Acoustical Society of America, Honolulu, HI, November (1988).
35. "A study of the timing of sonoluminescence flashes from stable cavitation," D.F. Gaitan, L.A. Crum and C.C. Church, presented at the 116th meeting of the Acoustical Society of America, Honolulu, HI, November (1988).
36. "The acoustic field of an oscillating bubble near a free surface," H.C. Pumphrey and L.A. Crum, presented at the 116th meeting of the Acoustical Society of America, Honolulu, HI, November (1988).
37. "Radiated noise increase of a submerged turbulent jet flow due to bubble entrainment," M.S. Korman, H.C. Pumphrey and L.A. Crum, presented at the 116th meeting of the Acoustical Society of America, Honolulu, HI, November (1988).
38. "Thresholds for surface wave generation on acoustically levitated gas bubbles", S. Horsburgh, R.G. Holt and L.A. Crum, presented at the 118th meeting of the Acoustical Society of America, St. Louis, MO, November (1989).

39. "Further studies of the underwater noise produced by rainfall", P.A. Elmore, H.C. Pumphrey and L.A. Crum, presented at the 118th meeting of the Acoustical Society of America, St. Louis, MO, November (1989).
40. "An experimental investigation of bubble clouds as sources of ambient noise", S.W. Yoon, L.A. Crum and A. Prosperetti, presented at the 118th meeting of the Acoustical Society of America, St. Louis, MO, November (1989).
41. "The scattering of sound by a cylindrical bubble cloud", M.S. Korman, R.A. Roy and L.A. Crum, presented at the 118th meeting of the Acoustical Society of America, St. Louis, MO, November (1989).
42. "The underwater sound of rainfall", R.R. Goodman, H.C. Pumphrey, L.A. Crum, and L. Bjørnø, presented at the 13th International Congress on Acoustics, Belgrade, Yugoslavia, August (1989).
43. "Acoustic cavitation and Extracorporeal Shock Wave Lithotripsy", C.C. Church and L.A. Crum, presented at the 13th International Congress on Acoustics, Belgrade, Yugoslavia, August (1989).
44. "Sonoluminescence and its application to medical ultrasound risk assessment", L.A. Crum and D.F. Gaitan, presented at the 33rd International Conference on Optical Engineering, San Diego, CA, July (1989).
45. "Collective oscillations of a bubble cloud", with S. W. Yoon, K. J. Park, N. Q. Lu, and A. Prosperetti, presented at the 2nd conference on Natural Physical Sources of Underwater Sound, Cambridge, England, July, 1990.
46. "The production of high frequency ambient noise by capillary waves", with R. A. Roy, and A. Kolaini, presented at the 2nd conference on Natural Physical Sources of Underwater Sound, Cambridge, England, July, 1990.
47. "Observation of sonoluminescence from a single stable cavitation bubble in a water/glycerine mixture", with D. F. Gaitan, presented at the 12th International Symposium on Nonlinear Acoustics, Austin, TX, August, 1990.
48. "A theoretical study of cavitation generated by four commercially available extracorporeal lithotripters", with C. Church, presented at the 12th International Symposium on Nonlinear Acoustics, Austin, TX, August, 1990.
49. "Collective Oscillations in a bubble cloud", with S. W. Yoon, K. J. Park, presented at the 119th meeting of the Acoustical Society of America, State College, PA, May, 1990.
50. "Observation of high frequency ambient noise generated by capillary waves", with A. Kolaini and R. Roy, presented at the 119th meeting of the Acoustical Society of America, State College, PA, May, 1990.
51. "Sonoluminescence from single bubbles", with D. Felipe Gaitan, presented at the 119th meeting of the Acoustical Society of America, State College, PA, May, 1990.

52. "Collective oscillations in a bubble column--higher nodes", with M. Nicholas, R. Roy, A. Prosperetti and N. Lu, presented at the 119th meeting of the Acoustical Society of America, San Diego, CA, November, 1990.
53. "The acoustic signatures of laboratory-generated bubble plumes", with A. Kolaini, M. Yi, and R. Roy, presented at the 119th meeting of the Acoustical Society of America, San Diego, CA, November, 1990.
54. "Large amplitude radial pulsations of a single, linear gas bubble: Comparison between theory and experiment", with D. Gaitan, C. Church and R. Roy, presented at the 119th meeting of the Acoustical Society of America, San Diego, CA, November, 1990.
55. "Cavitation from diagnostic ultrasound", with R. Roy, C. Holland, and R. Apfel, presented at the 119th meeting of the Acoustical Society of America, San Diego, CA, November, 1990.
56. "The effect of ultrasound on the ionic conductance across frog skin in the presence of free radical scavengers", with M. Dinno, W. Kennedy, R. Ingraham and B. Idom, presented at the 119th meeting of the Acoustical Society of America, San Diego, CA, November, 1990.
57. "The effect of extracorporeal shock wave lithotripsy on electrophysiological parameters across abdominal frog skin: real time observations" with M. Dinno, W. Kennedy, and C. Church, presented at 119th meeting of the Acoustical Society of America, San Diego, CA, November (1990).
58. "Low-frequency backscattering from a submerged bubble cloud", with R.A. Roy and M. Nicholas, presented at the 120th meeting of the Acoustical Society of America, Baltimore, MD, April, 1991.
59. "Bubble production by capillary waves" with A. Kolaini, and R.A. Roy, presented at the 120th meeting of the Acoustical Society of America, Baltimore, MD, April, 1991.
60. "The underwater sound produced by the impact of solid objects", with M. Nicholas and R.A. Roy, presented at the 120th meeting of the Acoustical Society of America, Baltimore, MD, April, 1991.
61. "The hydrodynamic and acoustic behavior of bubble plumes generated by an impacting water jet", with A. Kolaini and R. Roy, presented at the 120th meeting of the Acoustical Society of America, Baltimore, MD, April, 1991.
62. "The underwater sounds of falling snow," L. A. Crum, R. A. Roy, H. C. Pumphrey and A. Prosperetti, presented at the 122<sup>nd</sup> meeting of the Acoustical Society of America, Baltimore, MD, April, 1991.
63. "Air bubble interaction with a submerged axisymmetric water jet," S. M. Cordry, R. A. Roy and L. A. Crum, presented at the 122<sup>nd</sup> meeting of the Acoustical Society of America, Houston, TX, November, 1991.

64. "Sound velocity measurements in a bubble cloud," S. A. Cheyne and R. A. Roy, presented at the 122<sup>nd</sup> meeting of the Acoustical Society of America, Houston, TX, November, 1991.
65. "Collective oscillations in fresh and salt water bubble clouds," R. A. Roy, M. Nicholas, K. Markiewicz and L. A. Crum, presented at the 122<sup>nd</sup> meeting of the Acoustical Society of America, Houston, TX, November, 1991.

66. "Low-frequency acoustic scattering from a submerged bubble cloud," R. A. Roy, L. A. Crum, M. Nicholas, J. Schindall, W. A. Carey, W. A. Konrad, W. J. Marshall, E. C. Monahan and A. Prosperetti, presented at the 122<sup>nd</sup> meeting of the Acoustical Society of America, Houston, TX, November, 1991.
67. "Collective oscillations of a bubble cloud as a source of underwater ambient noise in the ocean," R. A. Roy, S. W. Yoon, M. Nicholas, K. J. Park and L. A. Crum, presented at Internoise 91, Sydney, Australia, November, 1991.
68. "Acoustic backscattering from a cylindrical bubble cloud in water," S. W. Yoon, K. J. Park, L. A. Crum, and R. A. Roy, presented at the Western Pacific Acoustic Conference IV, Sydney, Australia, November, 1991.
69. "Low-frequency backscatter from dense submerged bubble clouds", with R. A. Roy, W. Carey, M. Nicholas and J. Schindall, presented at the 123<sup>rd</sup> meeting of the Acoustical Society of America, Salt Lake City, UT, April (1992).
70. "Laboratory experiments on bubble cloud oscillations", with M. Nicholas and A. Kolaini, presented at the 123<sup>rd</sup> meeting of the Acoustical Society of America, Salt Lake City, UT, April (1992).
71. "A laboratory experiment on nonlinear coupling between surface and volume modes of a bubble", with Y. Mao and R. A. Roy, presented at the 123<sup>rd</sup> meeting of the Acoustical Society of America, Salt Lake City, UT, April (1992).
72. "Enhancement of hydrodynamic flow noise radiation by the regulation of air bubbles in a turbulent water jet", with M. S. Korman and R. A. Roy, presented at the 123<sup>rd</sup> meeting of the Acoustical Society of America, Salt Lake City, UT, April (1992).
73. "Acoustic emission from toroidal bubbles", with A. Kolaini and M. Nicholas, presented at the 123<sup>rd</sup> meeting of the Acoustical Society of America, Salt Lake City, UT, April (1992).
74. "Acoustic characteristics of laboratory breaking waves", with A. Kolaini, presented at the 124<sup>th</sup> meeting of the Acoustical Society of America, New Orleans, LA, October (1992).
75. "Sound scattering from near-surface bubble clouds", with J. Schindall, W. Carey, and R. A. Roy, presented at the 124<sup>th</sup> meeting of the Acoustical Society of America, New Orleans, LA, October (1992).
76. "Low frequency resonance backscatter from near-surface bubble clouds", with J. Schindall, R. A. Roy and W. M. Carey, presented at the NATO Symposium on Low Frequency Active Sonar, Lerici, Italy, July (1992).
77. "Resonance frequency and damping constant of a spherical gas-vapor bubble in an infinite medium", with Y. Mao and R. A. Roy, presented at the 125<sup>th</sup> meeting of the Acoustical Society of America, Ottawa, Canada, April (1993).



78. "Enhancement of hydrodynamic flow noise by the regulation of air bubbles in a turbulent water jet", with M. S. Korman, presented at the 125th meeting of the Acoustical Society of America, Ottawa, Canada, April (1993).
79. "Bubble-related sources of ocean ambient noise", with R. A. Roy, presented at the meeting of Ultrasonics International, Vienna, Austria, July (1993).
80. "Duty cycle and pulse length dependence of the acoustic cavitation threshold at megahertz frequencies", with A. Calabrese and R. A. Roy, presented at the 13th International Symposium on Nonlinear Acoustics, Bergen, Norway, June (1993).
81. "Low frequency backscatter from near-surface bubble plumes", with J. Schindall, R. Roy and W. Carey, presented at the 126th meeting of the Acoustical Society of America, Denver, CO, September (1993).
82. "The acoustic emissions from bubble plumes generated by an impacting transient water jet," with A. R. Kolaini, C. C. Church, and R. A. Roy, presented at the 14th meeting of the International Congress on Acoustics, Beijing, China, September (1992).
83. "Enhancement of hydrodynamic flow noise radiation by the regulation of air bubbles in a turbulent water jet", with M. S. Korman and R. A. Roy, presented at the 14th meeting of the International Congress on Acoustics, Beijing, China, September (1992).
84. "Low frequency scattering from resonant bubble clouds," with R. A. Roy, W. Carey, and M. Nicholas, presented at the 14th meeting of the International Congress on Acoustics, Beijing, China, September (1992).
85. "A new explanation for the double resonance of a pure vapor bubble", with Y. Mao, presented at the 126th meeting of the Acoustical Society of America, Denver, CO, September (1993).
86. "Acoustic roles of bubble clouds in the ocean," with S. W. Yoon, presented at the International Scientific School Seminar, Nizhny Novgorod, Russia, June, (1992).
87. "Some light emission features of single bubble sonoluminescence", with W. M. Cordry and R. A. Roy, presented at the 126th meeting of the Acoustical Society of America, Denver, CO, September (1993).
88. "Site(s) and mechanism(s) of action of therapeutic ultrasound on ion transport across frog skin", with D. A. Stoltz, M. A. Dinno, A.M. Al-Karmi, and J. C. Matthews, presented at the annual meeting of Experimental Biology (1993).
89. "Biophysical effects of therapeutic ultrasound on cellular and paracellular ionic conductance are calcium dependent", with A. M. Al-Karmi, M. A. Dinno, D. A. Stolz, and J. C. Matthews, presented at the 1993 Annual Meeting of the Biophysical Society.
90. "Can near surface bubble clouds and plumes lead to anomalous perturbations in low-frequency sea-surface scattering?", with R. A. Roy, J. A. Schindall, and W. M. Carey,

presented at the European Symposium on Underwater Acoustics, Copenhagen, Denmark, July (1994).

91. "Artificial bubble-cloud targets", with P. A. Hwang and R. A. Roy, presented at the third symposium on Sea Surface Sound , Lake Arrowhead, CA, March (1994).
92. "A novel technique for measuring the maximum radius of a sonoluminescing bubble, with S. M. Cordry, presented at the 127th meeting of the Acoustical Society of America, Cambridge, MA, June (1994).
93. "Artificial bubble cloud targets for acoustic remote sensing of the ocean", with P. A. Hwang and R. A. Roy, presented at the 127th meeting of the Acoustical Society of America, Cambridge, MA, June (1994).
94. "Acoustically enhanced bubble growth at low frequencies and its implications for human diver and marine mammal safety", with Y. Mao, presented at the 128th meeting of the Acoustical Society of America, Austin, TX, November (1994).
95. "Mass diffusion in spark-induced vapor bubbles", with J. S. Allen, M. A. Averkou, C. M. Young and G. R. Hess, presented at the 128th meeting of the Acoustical Society of America, Austin, TX, November (1994).
96. "Acoustic modeling of plasma-induced vapor bubbles", with G. R. Hess, A. E. Rodriguez, N. K. Winsor, C. M. Young and R. F. Stellingwerf, presented at the 128th meeting of the Acoustical Society of America, Austin, TX, November (1994).
97. "Focused acoustic pulses of finite amplitude and their influence on cavitation bubble dynamics", with M. A. Averkiou and M. F. Hamilton, presented at the 128th meeting of the Acoustical Society of America, Austin, TX, November (1994).
98. "The use of high intensity focused ultrasound for non-invasive surgery", with W. Law, presented at the 129th meeting of the Acoustical Society of America", Washington, DC, May (1995).
99. "Measurements of finite-amplitude acoustic pulses radiated from focused piston sources in water", with M. A. Averkiou and M. F. Hamilton, presented at the 129th meeting of the Acoustical Society of America", Washington, DC, May (1995).
100. "Nonlinear bubble oscillations and Bjerknes forces", with S. M. Cordry and R. A. Roy, presented at the 129th meeting of the Acoustical Society of America", Washington, DC, May (1995).
101. "The relative roles of thermal and nonthermal effects in the use of high intensity focused ultrasound for the treatment of benign prostatic hyperplasia", with W. Law, presented at the 15th International Congress on Acoustics, Trondheim, Norway, June (1995).
102. "Temperature-related effects in single-bubble sonoluminescence", with S. Cordry and R. A. Roy, presented at the 130th meeting of the Acoustical Society of America, St. Louis, MO, December (1995).

103. "Effects of frequency-dependent absorption on the propagation and attenuation of high-intensity acoustic waves containing shocks", with V. Khokhlova, O. Sapozhnikov, and M. Averkiou, presented at the 130th meeting of the Acoustical Society of America, St. Louis, MO, December (1995).
104. "Theoretical modeling of the acoustic pressure field produced by commercial lithotripters", with M. A. Averkiou and M. F. Hamilton, presented at the 130th meeting of the Acoustical Society of America, St. Louis, MO, December (1995).
105. "Measurements of the effect of polypropylene vials on ultrasound propagation", with R. Cleveland, M. Averkiou and J. McAteer, presented at the 131st meeting of the Acoustical Society of America, Indianapolis, IN, May (1996).
106. "Shock wave lithotripsy: A demonstration of experimental methods for *in vitro* shock wave exposure and analysis of cell injury", with J. McAteer, S. Andreoli, A. Evan, D. Denman, C. Mallett, R. Cleveland, M. Averkiou, J. Lingeman and D. Lifshitz, presented at the 131st meeting of the Acoustical Society of America, Indianapolis, IN, May (1996).
107. "Measurements of the acoustic emissions from glowing bubbles", with I. Hallaj, T. Matula, and R. Roy, presented at the 132nd meeting of the Acoustical Society of America, Honolulu, HI, December (1996).
108. "Preliminary experimental observations of the effects of buoyancy on single bubble sonoluminescence in microgravity and hypergravity", with T. Matula, R. Roy and D. Kuhn, presented at the 132nd meeting of the Acoustical Society of America, Honolulu, HI, December (1996).
109. "*In vivo* measurements of lithotripsy shock waves in pigs", with R. Cleveland, D. Lifshitz, B. Connors and A. Evan, presented at the 132nd meeting of the Acoustical Society of America, Honolulu, HI, December (1996).
110. "Comparisons of the calculated and measured acoustic pressure amplitudes from single bubble sonoluminescence", with T. Matula and W. Moss, presented at the 133rd meeting of the Acoustical Society of America, State College, PA, May (1997).
111. "Computer analysis of the resonant scattering of sound by a bubbly fluid encapsulated by a submerged spherical shell", with M. Korman and S. Swain, presented at the 133rd meeting of the Acoustical Society of America, State College, PA, May (1997).
112. "Bjerknes force and bubble levitation under single bubble sonoluminescence conditions", with T. Matula, S. Cordry and R. Roy, presented at the 134th meeting of the Acoustical Society of America, San Diego, CA, December (1998).
113. "B-scan ultrasound monitoring of cavitation activity in and around the kidney during shock wave lithotripsy", with R. Cleveland, D. Lifshitz, B. Connors, L. Willis, A. Evan and J. Lingeman", presented at the 134th meeting of the Acoustical Society of America, San Diego, CA, December (1998).



114. "Nonlinear effects in HIFU propagation and attenuation in biological tissue", with V. Khokhlova, and O. Sapozhnikov, presented at the 134th meeting of the Acoustical Society of America, San Diego, CA, December (1998).
115. "Single bubble sonoluminescence in microgravity", with T. Matula, J. Swalwell, V. Bezzerides, P. Hilmo, M. Chittick, D. Kuhns, and R. Roy, presented at the 134th meeting of the Acoustical Society of America, San Diego, CA, December (1998).
116. "Measurements of the transient response of single bubble sonoluminescence subject to an abrupt change in the drive pressure amplitude", with T. Matula, presented at the 134th meeting of the Acoustical Society of America, San Diego, CA, December (1998).
117. "Swl cavitation effects in vitro: modest pressurization at f2 reduces injury to isolated cells while damage to foil targets is increased", with James A. McAteer, Mark A. Stonehill, Karin Colmenares, James C. Williams, Jr., Andrew P. Evan, Robin O. Cleveland, and Michael R. Bailey, presented at the Annual Meeting of the American Urological Society, San Diego, June, 1998.
118. "Ultrasound contrast agents: Present but not seen", P.P. Chang, P.D. Mourad, S.L. Poliachik, L.A. Crum, 1998 IEEE Ultrasonics Symposium, October 5-8, 1998, Sendai, Japan.
119. "Investigation of High Intensity Focused Ultrasound for Blood Vessel Cauterization", with Roy Martin, Shahram Vaezy, Michael Caps, Peter Kaczkowski, George Keilman, Steve Carter, Wayne Chandler, and Kirk Beach, presented at the 16th International Congress on Acoustics and the 135th Meeting of the Acoustical Society of America, Seattle, June (1998).
120. "Acoustic liver cauterization: A potential tool for bloodless surgery", with R. Martin, S. Vaezy, S. Helton, M. Caps, P. Kaczkowski, G. Keilman, S. Carter, W. Chandler, P. Mourad, and K. Beach, presented at the 16th International Congress on Acoustics and the 135th Meeting of the Acoustical Society of America, Seattle, June (1998).
121. "Ex-vivo studies of the effects of high intensity focused ultrasound on whole blood", with S. Poliachik, W. Chandler, P. Mourad, S. Bloch, M. Bailey, R. Cleveland, P. Kaczkowski, G. Keilman, and T. Porter, presented at the 16th International Congress on Acoustics and the 135th Meeting of the Acoustical Society of America, Seattle, June (1998).
122. "Numerical simulations of tissue heating created by high intensity focused ultrasound", with F. P. Curra, P. D. Mourad, R. Cleveland, and V. A. Khokhlova, presented at the 16th International Congress on Acoustics and the 135th Meeting of the Acoustical Society of America, Seattle, June (1998).
123. "Occlusion of blood vessels using high intensity focused ultrasound", with S. Vaezy, R. Martin, P. Kaczkowski, G. Keilman, S. Carter, and M. Caps, presented at the 16th International Congress on Acoustics and the 135th Meeting of the Acoustical Society of America, Seattle, June (1998).

124. "Measurements of sound speed in excised tissue over temperatures expected under high intensity focused ultrasound conditions", with S. Bloch, M. Bailey, P. Kaczowski, P. Mourad and G. Keilman, presented at the 16th International Congress on Acoustics and the 135th Meeting of the Acoustical Society of America, Seattle, June (1998).
125. "The effects of organic compound doping in single bubble sonoluminescence", with M. Ashokkumar, F. Grieser, W. McNamara III, K. Suslick, T. Matula, and C. Frensley, presented at the 16th International Congress on Acoustics and the 135th Meeting of the Acoustical Society of America, Seattle, June (1998).
126. "Acoustic and system parameters affecting destruction of ultrasound contrast agents", with P. Chang, and I. Makin, presented at the 16th International Congress on Acoustics and the 135th Meeting of the Acoustical Society of America, Seattle, June (1998).
127. "Separation of cavitation and renal injury induced by shock wave lithotripsy (SWL) from SWL-induced impairment of renal hemodynamics", with A. Evan, L. Willis, B. Connors, J. McAteer, J. Lingeman, R. Cleveland, and M. Bailey, presented at the 16th International Congress on Acoustics and the 135th Meeting of the Acoustical Society of America, Seattle, June (1998).
128. "SWL cavitation damage in vitro: Pressurization unmasks a differential response of foil targets and isolated cells", with J. McAteer, M. Stonehill, K. Colmenares, J. Williams, A. Evan, R. Cleveland, and M. Bailey, presented at the 16th International Congress on Acoustics and the 135th Meeting of the Acoustical Society of America, Seattle, June (1998).
129. "Effect of overpressure on dissolution and cavitation of bubbles stabilized on a metal surface", with R. Cleveland, M. Bailey, M. Stonehill, J. Williams and J. McAteer, presented at the 16th International Congress on Acoustics and the 135th Meeting of the Acoustical Society of America, Seattle, June (1998).
130. "Radial response of single bubble sonoluminescence to novel excitations", with K. Hargreaves, T. Matula, and W. Moss, presented at the 16th International Congress on Acoustics and the 135th Meeting of the Acoustical Society of America, Seattle, June (1998).
131. "Measurements of the dynamic response of single bubble sonoluminescence near the luminescence and extinction thresholds", with T. J. Matula, presented at the 16th International Congress on Acoustics and the 135th Meeting of the Acoustical Society of America, Seattle, June (1998).
132. "Use of two pulses to control cavitation in lithotripsy", with M. Bailey, R. Cleveland, and D. Blackstock, presented at the 16th International Congress on Acoustics and the 135th Meeting of the Acoustical Society of America, Seattle, June (1998).
133. "Detection and control of lithotripsy-induced cavitation in blood", with B. Jordan, M. Bailey, and R. Cleveland, presented at the 16th International Congress on Acoustics and the 135th Meeting of the Acoustical Society of America, Seattle, June (1998).

134. "Fast spectral algorithm for modeling focused sound beams in a highly nonlinear regime", with V. Khokhlova, M. Averkiou, S. Younghouse, and M. Hamilton, presented at the 16th International Congress on Acoustics and the 135th Meeting of the Acoustical Society of America, Seattle, June (1998).
135. "Hemostatic Treatment of Punctured Blood Vessels with High Intensity Focused Ultrasound", Roy Martin, Shahram Vaezy, Kirk Beach, Michael Caps, Peter, Kaczkowski, George Keilman, Steve Carter, Wayne, Chandler, and Lawrence Crum, presented at the Annual meeting of the AIUM (American Institute of Ultrasound in Medicine), San Antonio, TX (March, 1999).
136. "Modification of SWL waveform separates renal injury from hemodynamic response", B. Connors, A. Evan, M. Bailey, L. Crum, J. McAteer, J. Williams, L. Willis, and J. Lingeman, presented at the 1999 Annual Meeting of the American Urological Association, Dallas, TX, April (1999).
137. "Acoustic cavitation in the presence of microbubble contrast agents," Chang P.P., Chen W. S., and Crum L. A., presented at the 4th European Symposium on Ultrasound Contrast Imaging, Rotterdam, Jan 1999.
138. "Detection of high-intensity focused ultrasound liver lesions using dynamic elasticity", X. Shi, R. W. Martin, D. Rouseff, S. Vaezy and L. A. Crum, presented at the 23<sup>rd</sup> International Symposium on Ultrasonic Imaging and Tissue Characterization, (Arlington, VA) May, 1998.
139. "Successful High Intensity Focused Ultrasound (H(FU) treatment of uterine fibroid tumors in a nude mouse model", V.Y. Fujimoto, C. Walker, G. Keilman, R. Martin, S. Vaezy and L. A. Crum, American Society for Reproductive Medicine, (Toronto) September (1999).
140. "Effect of high intensity focused ultrasound on whole blood with and without contrast agents", S. L. Poliachik, P. D. Mourad, W. Chandler and L. A. Crum, IEEE International Ultrasonics Symposium, 5-8 October 1998, Sendai, Japan.
141. "High intensity focused ultrasound and tissue heating: the effect of nonlinear sound propagation and vessel presence," F. P. Curra, P. D. Mourad, V. A. Khokhlova, and L. A. Crum, IEEE International Ultrasonics Symposium, 5-8 October 1998, Sendai, Japan.
142. "Portable ultrasound device for battlefield trauma," J. J. Hwang, J. Quistgaard, J. Souquet, and L. A. Crum, IEEE International Ultrasonics Symposium, 5-8 October 1998, Sendai, Japan.
143. Ultrasound contrast agents: present but not seen," P. P. Chang, W. S. Chen, P. D. Mourad, S. L. Poliachik, L. A. Crum, " IEEE International Ultrasonics Symposium, 5-8 October 1998, Sendai, Japan.
144. "A practical high intensity ultrasound applicator for surgery using solid cones", R. W. Martin, M. D. Brentnall, S. Vaezy, P. Kaczkowski, and L. A. Crum; IEEE International Ultrasonics Symposium, Lake Tahoe, Oct (1999).

145. "Ultrasound Accelerates Functional Recovery after Peripheral Nerve Damage", P. Mourad, F. Curra, D. Lazar, A. Avellino, L. McNutt, K. Andrus, M. Klot and L. A. Crum: IEEE International Ultrasonics Symposium, Lake Tahoe, Oct (1999).
146. "Ultrasound Accelerates Functional Recovery after Peripheral Nerve Damage P. Mourad, A. Mesiwala, L. Farrell, D. Sokolov, S. Vaezy, P. Santiago, M. Mayberg, D. Silbergeld and L. A. Crum: IEEE International Ultrasonics Symposium, Lake Tahoe, Oct (1999).
147. "Color Doppler imaging of acoustic streaming in blood and clots", X Shi, R. Martin, S. Vaezy, and L. A. Crum: IEEE International Ultrasonics Symposium, Lake Tahoe, Oct (1999).
148. "Mechanisms of extracorporeal shock wave lithotripsy", Cleveland R. O., Bailey M.R., Crum L.A., and Evan A.P., presented at the 29th Annual Ultrasonic Industry Association (UIA) Symposium, June 7-8, 1999 Baltimore, MD.
149. "Effect of selective absorption on nonlinear interactions in high intensity acoustic beams", V. A. Khokhlova, S. S. Kashcheeva, M. A. Averkiou and L. A. Crum, Presented at the 16<sup>th</sup> International Symposium on Nonlinear Acoustics, Gottingen (July, 1999).
150. "Enhancement of ultrasound-induced heating in tissue phantoms due to formation of shocks: Experimental measurements and numerical simulations, V. A. Khokhlova, O. A. Sapozhnikov, Y. Pishchalnikov, T. V. Siunilo, E. A. Filonenko and L. A. Crum, Presented at the 9<sup>th</sup> Congress of the World Federation on Ultrasound in Medicine and Biology, Florence, Italy (May, 2000).
151. "Simultaneous detection of acoustic and light emissions from cavitation bubbles in shock-wave lithotripsy", T. J. Matula, M. R. Bailey, P. R. Hilmo, D. L. Sokolov, and L. A. Crum, presented at the IUTAM Symposium on Free Surface Flows, Birmingham, UK, (July, 2000).
152. "In vitro detection of cavitation induced by lithotripsy shock waves in pig kidney", O. A. Sapozhnikov, M. R. Bailey, R. O. Cleveland, S. Vaezy, J. A. McAteer, A. P. Evan and L. A. Crum, Presented at the 9<sup>th</sup> Congress of the World Federation on Ultrasound in Medicine and Biology, Florence, Italy (May, 2000).
153. "Color Doppler imaging of acoustic streaming in blood an clot", X. Shi, R. W. Martin, W. Vaezy, and L. A. Crum, Presented at the 1999 IEEE Ultrasonics Symposium, Reno, Nevada; Oct, 1999.
154. "Biological mechanisms of acoustically-induced hemostasis", S. Vaezy, R. Martin, B. Goldman, E. Chi, W. Chandler, P. Kaczkowski, and L. A. Crum, Presented at the 1999 IEEE Ultrasonics Symposium, Reno, Nevada; Oct, 1999.
155. "Numerical modeling of HIFU for hemostatic applications, V. Khokhlova, P. Kaczkowski and L. A. Crum, Presented at the 137<sup>th</sup> meeting of the Acoustical Society of America, Berlin (March, 1999).

156. "The search for electrical discharges from single and multibubble sonoluminescence", A. J. Bezzerides, T. J. Matula, and L. A. Crum, Presented at the 137<sup>th</sup> meeting of the Acoustical Society of America, Berlin (March, 1999).
157. "Effect of tone-burst ultrasound in combination with PPAA on hemolysis of erythrocytes", T. M. Porter, P. Mourad and L. A. Crum, Presented at the 137<sup>th</sup> meeting of the Acoustical Society of America, Berlin (March, 1999).
158. "The effects of temperature on the characteristics of the focal region in HIFU", F. P. Curra, P. D. Mourad, and L. A. Crum, Presented at the 137<sup>th</sup> meeting of the Acoustical Society of America, Berlin (March, 1999).
159. "Shot-to-shot variability of acoustic axis of a spark-source lithotripter", O. A. Sapozhnikov, M. R. Bailey and L. A. Crum, Presented at the 137<sup>th</sup> meeting of the Acoustical Society of America, Berlin (March, 1999).
160. "Use of two pulses to localize and intensify cavitation in lithotripsy", D. L. Sokolov, M. R. Bailey and L. A. Crum, Presented at the 138<sup>th</sup> meeting of the Acoustical Society of America, Columbus (November, 1999).
161. "Effect of HIFU on platelet activation, aggregation and adhesion", S. L. Poliachik, P. D. Mourad, W. L. Chandler and L. A. Crum, Presented at the 139<sup>th</sup> meeting of the Acoustical Society of America, Atlanta (June, 2000).
162. "Quantitative measurement of cavitation activity during red blood cell lysis and sonoporation", W. Chen, T. M. Porter, P. D. Mourad, P. H. Chang, M. Hadley and L. A. Crum, Presented at the 139<sup>th</sup> meeting of the Acoustical Society of America, Atlanta (June, 2000).
163. "Ultrasonic release of insulin from implantable, bio-compatible polymers coated with self-assembling membranes", P. D. Mourad, C. Kwok, B. Ratner, and L. A. Crum, Presented at the 139<sup>th</sup> meeting of the Acoustical Society of America, Atlanta (June, 2000).
163. "Enhanced release of drugs from a novel polymeric film coated with self-healing, order methylene chains induce by hydrodynamic shear", T. M. Porter, P. D. Mourad, C. Kwok, B. D. Ratner, and L. A. Crum, Presented at the 139<sup>th</sup> meeting of the Acoustical Society of America, Atlanta (June, 2000).
164. "Focused ultrasound opens the blood-brain barrier in vivo", P. D. Mourad, A. Mesiwala, H. R. Winn, D., L. Silbergeld, and L. A. Crum, Presented at the 139<sup>th</sup> meeting of the Acoustical Society of America, Atlanta (June, 2000).
165. "Correlations between UCA-destruction-induced bioeffects and inertial cavitation dose", S. Chen, P. Chang, T. J. Matula and L. A. Crum, Presented at the 139<sup>th</sup> meeting of the Acoustical Society of America, Atlanta (June, 2000).
166. "3D full wave ultrasonic field and temperature simulations in biological tissue containing a blood vessel", F. P. Curra, P. D. Mourad, V. A. Khokhlova and L. A. Crum, Presented at the 139<sup>th</sup> meeting of the Acoustical Society of America, Atlanta (June, 2000).



167. "Ultrasound accelerates the healing of damaged peripheral nerves *in vivo*", P. D. Mourad, F. Curra, D. Lazar, M. Kliot, and L. A. Crum, Presented at the 139<sup>th</sup> meeting of the Acoustical Society of America, Atlanta (June, 2000).
168. "SWL stone fragmentation *in vitro* is improved by slowing the SW delivery rate", D. A. Lifshitz, J. C. Williams, A. Evan, D. L. Rietjens, J. A. McAteer, M. R. Bailey, O. A. Sapozhnikov and L. A. Crum, Presented at the 139<sup>th</sup> meeting of the Acoustical Society of America, Atlanta (June, 2000).
169. "Bubble translation due to radiation force in SWL", D. L. Sokolov, M. R. Bailey, O. A. Sapozhnikov, and L. A. Crum, Presented at the 139<sup>th</sup> meeting of the Acoustical Society of America, Atlanta (June, 2000).
170. "Simultaneous detection of acoustic and light emissions from cavitation bubbles in SWL", T. J. Matula, P. R. Hilmo and L. A. Crum, Presented at the 139<sup>th</sup> meeting of the Acoustical Society of America, Atlanta (June, 2000).
171. "Effect of dual-reflector lithotripter on stone fragmentation and cell damage", D. L. Sokolov, M. R. Bailey and L. A. Crum, Presented at the 140<sup>th</sup> meeting of the Acoustical Society of America, Newport Beach (December, 2000).
172. "Real-time observation of inception and growth of HIFU-induced tissue lesions", C. Lafon, M. R. Bailey, L. N. Couret, P. J. Kaczkowski, A. A. Brayman, O. A. Sapozhnikov, and L. A. Crum, Presented at the 140<sup>th</sup> meeting of the Acoustical Society of America, Newport Beach (December, 2000).
173. "Theoretical predictions of ultrasonic fields, temperature response, and lesion dynamics in biological tissue for the purpose of noninvasive disease treatment", F. P. Curra, P. D. Mourad, S. G. Kargl, V. A. Khokhlova and L. A. Crum, Presented at the 140<sup>th</sup> meeting of the Acoustical Society of America, Newport Beach (December, 2000).
174. "Platelet activity as a result of exposure to HIFU", S. L. Poliachik, R. J. Ollos, P. D. Mourad, W. L. Chandler, and L. A. Crum, Presented at the 140<sup>th</sup> meeting of the Acoustical Society of America, Newport Beach (December, 2000).
175. "Influence of chemical composition of membrane-disrupting polymers on relative cavitation activity and hemolysis", T. M. Porter, J. Nickerson, F. E. Black, N. Murthy, P. S. Stayton, A. S., Hoffman and L. A. Crum, Presented at the 140<sup>th</sup> meeting of the Acoustical Society of America, Newport Beach (December, 2000).
176. "Behavior of ultrasound contrast agents near the fragmentation threshold", W. Chen, T. J. Matula and L. A. Crum, Presented at the 140<sup>th</sup> meeting of the Acoustical Society of America, Newport Beach (December, 2000).
177. "Surface Characterization to Qualify an Ultrasound-Stimulated Molecular Switch Device for Insulin Delivery", B. D. Ratner, C. Kwok, P. Mourad and L. A. Crum Presented at the summer meeting of the Controlled Release Society (July, 2002).

178. "High intensity focused ultrasound (HIFU): A revolutionary means of facilitating liver resection", R. W. Martin, S. Vaezy, S. Helton, M. Caps, P. Kaczkowski, S. Carter, C. Cornejo, and L. A. Crum. *Gastroenterology* 1999;116 (4): S0164, Part 2.
179. "Acute bleeding from liver injury stopped by high intensity focused ultrasound" Vaezy S, Martin RW, Helton S, Caps M, Kaczkowski P, Carter S, Cornejo C, Sharar S, and L. A. Crum, *Gastroenterology* 1999;116 (4): S0305, Part 2.
180. "Real-time observation of inception and growth of HIFU-induced tissue lesions", C. Lafon, M. Bailey, L. Couret, P. Kaczkowski, O. Sapozhnikov, A. Brayman, and L. A. Crum, Presented at the 140<sup>th</sup> meeting of the Acoustical Society of America, Newport Beach, (December, 2000).
181. "Real-Time Visualization of Therapeutic Ultrasound: Applied to Acoustic Hemostasis," R. Martin, S. Vaezy, X. Shi, P. Kaczkowski, M. Paun, K. Beach, and L. A. Crum, presented at the 9<sup>th</sup> Congress of the World Federation for Ultrasound in Medicine and Biology, (Florence Italy, May, 2000).
182. "Effect of high-intensity focused ultrasound on platelet aggregation," S. L. Poliachik, W. L. Chandler, P. D. Mourad, R. J. Ollos, and L. A. Crum, presented at the 9<sup>th</sup> Congress of the World Federation for Ultrasound in Medicine and Biology, (Florence Italy, May, 2000).
183. "Effect of high-intensity focused ultrasound on platelet activation and adhesion", S. L. Poliachik, W. L. Chandler, P. D. Mourad, R. J. Ollos, and L. A. Crum, presented at 2000 IEEE International Ultrasonics Symposium, San Juan, Puerto Rico, 22-25 October 2000.
184. "Measured bioeffects of tone-burst ultrasound in combination with Poly(propyl acrylic acid (PPAA)", T. Porter, M. Hadley, J. Nickerson, P. Mourad, and L. A. Crum, presented at 2000 IEEE International Ultrasonics Symposium, San Juan, Puerto Rico, 22-25 October 2000.
185. "Activation, Aggregation, and Adhesion of platelets exposed to high intensity focused ultrasound", S. L. Poliachik, W. L. Chandler, P. D. Mourad, R.J. Ollos and L. A. Crum, presented at 2000 IEEE International Ultrasonics Symposium, San Juan, Puerto Rico, 22-25 October 2000.
186. "Increased damage to stones without increased damage to cells with a dual-reflector lithotripter", D. L. Sokolov, M. R. Bailey, F. Pulvermakher and L. A. Crum, presented at 2000 IEEE International Ultrasonics Symposium, San Juan, Puerto Rico, 22-25 October 2000.
187. "Experimental investigation and finite element simulation of streaming in blood in cylindrical models", X. Shi, R. Martin, S. Vaezy and L. A. Crum, presented at 2000 IEEE International Ultrasonics Symposium, San Juan, Puerto Rico, 22-25 October 2000.
188. "Ultrasound contrast agent behavior near the fragmentation threshold", W-S Chen, T. J. Matula and L. A. Crum, presented at 2000 IEEE International Ultrasonics Symposium, San Juan, Puerto Rico, 22-25 October 2000.

189. "Ultrasound-guided localized detection of cavitation during lithotripsy in pig kidney *in vivo*", O. A. Sapozhnikov, L. A. Crum, et al., presented at the 2001 IEEE Ultrasonics Symposium, Atlanta, October, 2001.
190. "A light-scattering technique for investigating the destruction of ultrasound contrast agents", W-S Chen, T. J. Matula and L. A. Crum, presented at the 2001 IEEE Ultrasonics Symposium, Atlanta, October, 2001.
191. "Detection of High Intensity Focused Ultrasound liver lesions using dynamic elasticity", presented at the 23<sup>rd</sup> International symposium on Ultrasonic Imaging and Tissue Characterization, (Arlington, VA), May, 1998.
192. "Theoretical predictions of ultrasound fields, temperature response, and lesion dynamics in biological tissue for the purpose of noninvasive disease treatment, F. P. Curra, P. D. Mourad, S. G. Kargl, and L. A. Crum, Presented at the 139<sup>th</sup> meeting of the Acoustical Society of America, Atlanta (June, 2000).
193. "Hemostasis of catheter-induced femoral artery injuries using image-guided transcutaneous High Intensity Focused Ultrasound", S. Vaezy, R. Martin, X. Shi, M. Paun, K. Beach, P. Kaczowski, G. Keilman, S. Carter, M. Bailey and L. A. Crum, presented at the Annual Biomedical Engineering Society Meeting, Seattle, May, 2001.
194. "Thermal effects of sawtooth waveform HIFU in tissue phantoms", O. A. Sapozhnikov, V. A. Khokhlova, T. V. Sinilo, E. A. Filonenko and L. A. Crum, presented at the 17<sup>th</sup> International Congress on Acoustics, Rome, September, 2001.
195. "Role of High Intensity Focused Ultrasound induced cavitation on platelet aggregation", S. L. Poliachik, W. L. Chandler, R. J. Ollos and L. A. Crum, presented at the 17<sup>th</sup> International Congress on Acoustics, Rome, September, 2001.
196. "Localized cavitation detection in lithotripsy *in vivo*", M. R. Bailey, L. A. Crum, N. A. Miller, O. A. Sapozhnikov, Y. A. Pishchalnikov, J. A. McAteer, B. Connors and A. P. Evan, presented at the 17<sup>th</sup> International Congress on Acoustics, Rome, September, 2001.
197. "Slowing the pulse repetition frequency in shock wave lithotripsy improves stone fragmentation *in vivo*", R. F. Paterson, D. A. Lifshitz, J. E. Lingeman, J. C. Williams, D. L. Rietjens, A. P. Connors, M. R. Bailey, L. A. Crum, R. O. Cleveland, Y. A. Pishchalnikov, I. V. Pishchalnikova and J. A. McAteer, presented at the 17<sup>th</sup> International Congress on Acoustics, Rome, September, 2001.
198. "Theoretical predictions and experimental results for non-invasive disease treatment via High Intensity Focused Ultrasound: A comparative study", F. P. Curra, S. G. Kargl, C. Lafon and L. A. Crum, presented at the 17<sup>th</sup> International Congress on Acoustics, Rome, September, 2001.
199. "A new synthetic tissue-mimicking phantom for High Intensity Focused Ultrasound", C. Lafon, S. Vaezy, M. L. Noble, P. J. Kaczowski, R. W. Martin and L. A. Crum, presented at the 17<sup>th</sup> International Congress on Acoustics, Rome, September, 2001.



200. "An innovative synthetic tissue-mimicking material for HIFU", C. Lafon, O. A. Sapozhnikov, P. J. Kaczowski, S. Vaezy, M. Noble and L. A. Crum, presented at the 142<sup>nd</sup> meeting of the Acoustical Society of America, Fort Lauderdale, December (2001).
201. "A multi-channel HIFU system for image-guided therapy", P. J. Kaczowski, S. Vaezy, R. Martin, G. Keilman and L. A. Crum, presented at the 142<sup>nd</sup> meeting of the Acoustical Society of America, Fort Lauderdale, December (2001).
202. "An optimal protocol for shock wave delivery by the dual-pulse lithotripter", D. L. Sokolov, M. R. Bailey and L. A. Crum, presented at the 142<sup>nd</sup> meeting of the Acoustical Society of America, Fort Lauderdale, December (2001).
203. "A novel cavitation probe design and some preliminary measurements of its application to megasonic cleaning", G. W. Ferrell and L. A. Crum, presented at the 8<sup>th</sup> meeting of the European Society of Sonochemistry, Villasimius, Sardinia (September, 2002).
204. "Ultrasound enhances Factor IX Gene Transfer into Mouse Livers", Carol H. Miao, Andrew A. Brayman, Peiqing Ye, Pierre Mourad, and Lawrence A. Crum, American Society of Gene Therapy, Washington DC (June 4-8, 2003).
205. "Nonlinear imaging methods in diagnostic medical ultrasound", V. A. Khokhlova, M. A. Averkiou, M. A. Bailey, and L. A. Crum, Conference on Nonlinear Acoustics, Nizhnii-Novgorod (September, 2003).
206. "Cavitation detection and suppression in HIFU", M. R. Bailey, J. Reed, A. Anand, P. Kaczowski, W. Kreider, S. Vaezy, L. A. Crum, R. Seip, J. Tavakkoli, and N. T. Sanghvi, presented at the 3<sup>rd</sup> International Symposium on Therapeutic Ultrasound, Lyon, France (May, 2003).
207. "Cavitation in shockwave lithotripsy", M. R. Bailey, L. A. Crum, O. A. Sapozhnikov, A. P. Evan, J. A. McAteer, R. O. Cleveland and T. Colonius, presented at the 2003 International Symposium on Cavitation, Osaka, Japan (November, 2003).
208. "Nonlinear Effects in HIFU Lesion Production in a Tissue-Mimicking Phantom", V.A. Khokhlova, P.J. Kaczowski, B.W. Cunitz, M.R. Bailey, J.A. Reed, M. Nakazawa and L.A. Crum, presented at the 3<sup>rd</sup> International Symposium on Therapeutic Ultrasound, Lyon, France (May, 2003).
209. "Nonlinear Effects in HIFU Lesion Production in a Tissue-Mimicking Phantom", V.A. Khokhlova, P.J. Kaczowski, B.W. Cunitz, M.R. Bailey, J.A. Reed, M. Nakazawa and L.A. Crum, presented at the 3<sup>rd</sup> International Symposium on Therapeutic Ultrasound, Lyon, France (May, 2003).
210. "Evaluation of water-cooled surgical applicators in a blunt trauma model", R. W. Martin, S. Vaezy, C. Cornejo, G. Jurkovich and L. A. Crum, Presented at the 10<sup>th</sup> World Congress of the World Federation for Ultrasound in Medicine and Biology, Montreal (June, 2003).

211. "Optimal parameters of HIFU for intraoperative hemostasis", S. Vaezy, S. Vaezy, F. Starr, E. Chi, C. Cornejo, S. Sharar, R. Martin and L. A. Crum, Presented at the 10th World Congress of the World Federation for Ultrasound in Medicine and Biology, Montreal (June, 2003).
212. "Nonlinear propagation of short ultrasound pulses generated by rectangular diagnostic transducers", A. E. Ponomaryov, V. A. Khokhlova, M. A. Averkiou and L. A. Crum, presented at the 3<sup>rd</sup> International Symposium on Therapeutic Ultrasound, Lyon, France (May, 2003).
213. "Modeling of stresses generated by a lithotripter shock wave in a cylindrical kidney stone", O. A. Sapozhnikov, R. O. Cleveland, M. R. Bailey and L. A. Crum, presented at the 3<sup>rd</sup> International Symposium on Therapeutic Ultrasound, Lyon, France (May, 2003).
214. "Development of power supplies for portable HIFU therapy systems", N. R. Owen, M. R. Bailey, B. J. P. Mortimer, H. Kolve, J. Hossack and L. A. Crum, presented at the 3<sup>rd</sup> International Symposium on Therapeutic Ultrasound, Lyon, France (May, 2003).
215. "Synchronization of HIFU therapy system with an arbitrary ultrasound imager", N. Owen, M. Bailey, J. Hossack and L. A. Crum, presented at the 146<sup>th</sup> Meeting of the Acoustical Society of America, Austin, TX (October, 2003).
216. "Numerical investigation of dual-frequency HIFU pulsing for lithotripsy", W. Kreider, M. Bailey and L. A. Crum, presented at the 146<sup>th</sup> Meeting of the Acoustical Society of America, Austin, TX (October, 2003).
217. "Dynamics of concerted bubble cluster collapse in shock wave lithotripsy", Y. A. Pishchalnikov, J. McAteer, A. P. Evan, O. Sapozhnikov, R. O. Cleveland, T. Colonius, M. R. Bailey, and L. A. Crum, presented at the 146<sup>th</sup> Meeting of the Acoustical Society of America, Austin, TX (October, 2003).
218. "Assessing the mechanism for kidney stone comminution by a lithotripter shock pulse", O. A. Sapozhnikov, M. R. Bailey, A. D. Maxwell, B. MacConaghy, R. O. Cleveland, and L. A. Crum, presented at the 4<sup>th</sup> International Symposium on Therapeutic Ultrasound, Kyoto, Japan, (September, 2004).
219. "Measurements of acoustic pressure at high amplitudes and intensities", L. A. Crum, M. R. Bailey, P. Kaczowski, J. A. McAteer, Y. A. Pishchalnikov and O. A. Sapozhnikov, presented at a meeting on Advanced Metrology for Ultrasound in Medicine, Teddington, UK, April (2004).
220. "Cavitation bubble cluster behavior on a stone surface in shock wave lithotripsy," Y. A. Pishchalnikov, O. A. Sapozhnikov, J. C. Williams, Jr., A. P. Evan, J. A. McAteer, R. O. Cleveland, T. Colonius, M. R. Bailey, and L. A. Crum, presented at the 16th International Symposium on Nonlinear Acoustics (Moscow, Russia, 2002).
221. "Nonlinear Regimes of Lesion Formation by HIFU in Tissue-mimicking Phantom," V. A. Khokhlova, P. J. Kaczowski, B. W. Cunitz, M. R. Bailey, and L. A. Crum, presented at the 16th International Symposium on Nonlinear Acoustics (Moscow, Russia, 2002).

222. "Thermal effects of sawtooth waveform HIFU in tissue phantoms," O.A. Sapozhnikov, V.A. Khokhlova, T.V. Sinilo, E.A. Filonenko, and L.A. Crum, presented at the 17th International Congress on Acoustics (Rome, Italy, Sept 2-7, 2001).
223. "Cavitation bubble cluster behavior on a stone surface in shock wave lithotripsy," Y. A. Pishchalnikov, O. A. Sapozhnikov, J. C. Williams, Jr., A. P. Evan, J. A. McAteer, R. O. Cleveland, T. Colonius, M. R. Bailey, and L. A. Crum, presented at the 16th International Symposium on Nonlinear Acoustics (Moscow, Russia, 2002).
224. "Overpressure and the role of bubbles in focused ultrasound lesion shape," M. R. Bailey, L. N. Couret, O. A. Sapozhnikov, V. A. Khokhlova, G. ter Haar, S. Vaezy, X. Shi, R. Martin, and L. A. Crum, presented at the 1st Intern. Workshop on the Application of High Intensity Focused Ultrasound (HIFU) in Medicine, May 10-12 2001, Chongqing, China.
225. "Slowing the pulse repetition frequency in shock wave lithotripsy (SWL) improves stone fragmentation in vivo," R. F. Paterson, D. A. Lifshitz, J. E. Lingeman, J. C. Williams, D. L. Rietjens, A. P. Evan, B. A. Connors, M. R. Bailey, L. A. Crum, R. O. Cleveland, Y. A. Pishchalnikov, I. V. Pishchalnikova, and J. A. McAteer, presented at the 17th International Congress on Acoustics (Rome, Italy, 2001).
226. "Shot-to-shot variability of acoustic axis of a spark-source lithotripter," O. A. Sapozhnikov, M. R. Bailey, and L. A. Crum, presented at the 139th Meeting of the Acoustical Society of America (Berlin, Germany, 1999).
227. "Role of cavitation bubble cluster activity in the breakage of kidney stones by lithotripter shock waves," Y. A. Pishchalnikov, O. A. Sapozhnikov, M. R. Bailey, J. C. Williams, Jr., R. O. Cleveland, T. Colonius, L. A. Crum, A. P. Evan, and J. A. McAteer, presented at the Annual Meeting of the American Urological Association, (Orlando, Florida, May, 2002)
228. "In vivo detection of cavitation in parenchyma of the pig kidney during shock wave lithotripsy," A. Evan, M. Bailey, R. Cleveland, O. Sapozhnikov, B. A. Connors, Y. Pishchalnikov, I. Pishchalnikova, L. Crum, J. McAteer, N. Miller, J. Lingeman, L. Willis, B. Connors, and P. Blomgren, presented at the Annual Meeting of the American Urological Association, (Orlando, Florida, May, 2002)
229. "Thermal effects of sawtooth waveform HIFU in tissue phantoms," O.A. Sapozhnikov, V.A. Khokhlova, T.V. Sinilo, E.A. Filonenko, and L.A. Crum, presented at the 1st International Workshop on the Applications of HIFU in Medicine, (Chongqing, China, May 10-12, 2001).
230. "Nonlinear enhancement and saturation phenomena in HIFU," V.A. Khokhlova and L.A. Crum, presented at the 1st International Workshop on the Applications of HIFU in Medicine, (Chongqing, China, May 10-12, 2001).
231. "HIFU hemostasis of liver injuries enhanced by ultrasound contrast agents", V. Zderic, S. Vaezy, A.A. Brayman, T. J. Matula, G. E. O'Keefe, and L. A. Crum, presented at the 4<sup>th</sup> International Symposium on Therapeutic Ultrasound, Kyoto, Japan (September, 2004).

232. "Intra-operative hemostasis of punctured femoral artery using HIFU: A survival study", V. Zderic, A. Keshavarzi, M. L. Noble, M. Paun, S. R. Sharar, L. A. Crum, R. W. Martin, and S. Vaezy, presented at the 4<sup>th</sup> International Symposium on Therapeutic Ultrasound, Kyoto, Japan (September, 2004).
233. "Acoustic nonlinearity in the derating problems for HIFU sources", V. A. Khokhlova, M. R. Bailey, and L. A. Crum, presented at the 4<sup>th</sup> International Symposium on Therapeutic Ultrasound, Kyoto, Japan (September, 2004).
234. "Design and evaluation of complex moving HIFU treatment protocols", S. G. Kargl, M. A. Andrew, P. J Kaczkowski, A. A. Brayman and L. A. Crum, presented at the 4<sup>th</sup> International Symposium on Therapeutic Ultrasound, Kyoto, Japan (September, 2004).
235. "Beaked whales, sonar and the 'bubble hypothesis', Paul D. Jepson, Dorian S. Houser, Lawrence A. Crum, Peter L. Tyack, Antonio Fernández, presented at the Annual Conference of the European Cetacean Society, La Rochelle, France 7-11 April 2004.
236. "Interactions of cavitation bubbles observed by high-speed imaging in shock wave lithotripsy", Yuri A. Pishchalnikov, Oleg A. Sapozhnikov, Michael R. Bailey, James A. McAteer, James C. Williams, Jr., Andrew P. Evan, Robin O. Cleveland , and Lawrence A. Crum, Presented at the 17<sup>th</sup> International Symposium on Nonlinear Acoustics, (State College, PA), July, 2005.
237. "Measurements of acoustic pressure at high amplitudes and intensities", LA Crum, MR Bailey, PKaczkowski, JA McAteer, YA Pishchalnikov and OA Sapozhnikov, presented at the meeting Advanced Metrology for Ultrasound in Medicine, Teddington, UK, April (2004).
238. "Use of HIFU for vessel occlusion", Joo Ha Hwang, Michael Kimmey, Andrew Brayman and Lawrence A. Crum, presented at the joint meeting of the World Congress on Ultrasound and Ultrasonics International, Beijing, PRC (September, 2005).
239. "Nonlinear phenomena in modern applications of ultrasound and shock waves in medicine", L.A. Crum, M.R. Bailey, R.O. Cleveland, O.A. Sapozhnikov, and V.A. Khokhlova, presented at the 2nd International Conference "Frontiers of Nonlinear Physics", July 5-12, 2004, Nizhny Novgorod – St. Petersburg, Russia. In: Proc. ed. A. Litvak, ISBN 5-8048-0050-7, pp. 663-673. Book of abstracts, p. 77-78.
240. "The relative effects of cavitation and nonlinear ultrasound propagation on dynamics of thermal lesions in a tissue phantom", V.A. Khokhlova, M.R. Bailey, J. Reed, and P.J. Kaczkowski, and L.A. Crum, presented at the 2nd International Conference "Frontiers of Nonlinear Physics", July 5-12, 2004, Nizhny Novgorod – St. Petersburg, Russia. In: Proc. ed. A. Litvak, ISBN 5-8048-0050-7, pp. 679-684. Book of abstracts, p. 79-80.
241. "Vibro-acoustography for targeting kidney stones during lithotripsy", Neil Owen, Michael Bailey, Adam Maxwell, Brian MacConaghy, Tatiana Khokhlova and



- Lawrence A. Crum, presented at the 148<sup>th</sup> meeting of the Acoustical Society of America, San Diego, CA (November, 2004).
242. "A potential explanation for marine mammal strandings", Lawrence A. Crum, Steve Kargl and Tom Matula, presented at the 148<sup>th</sup> meeting of the Acoustical Society of America, San Diego, CA (November, 2004).
  243. "Dual frequency high intensity focused ultrasound to accelerate hemostasis", Michael Bailey, Adam Maxwell, Justin Reed, Wayne Kreider, Vera Khokhlova, Vesna Zderic, Shahram Vaezy and Lawrence A. Crum, presented at the 148<sup>th</sup> meeting of the Acoustical Society of America, San Diego, CA (November, 2004).
  244. "Vector Doppler ultrasound for the detection of internal bleeding", Bryan Cunitz, Peter Kaczowski and Lawrence A. Crum, presented at the 148<sup>th</sup> meeting of the Acoustical Society of America, San Diego, CA (November, 2004).
  245. "Observation of cavitation during shock wave lithotripsy", Michael Bailey, Lawrence A. Crum, Yuri Pishchalnikov, James McAteer, Irina Pishchalnikova, Andrew Evan, Oleg Sapozhnikov and Robin Cleveland, presented at the 149<sup>th</sup> meeting of the Acoustical Society of America, Vancouver, BC (May, 2005).
  246. "A mechanistic analysis of stone comminution in lithotripsy", Adam Maxwell, Oleg Sapozhnikov, Michael Bailey, Brian MacConaghy and Lawrence A. Crum, presented at the 149<sup>th</sup> meeting of the Acoustical Society of America, Vancouver, BC (May, 2005).
  247. "Ultrasound contrast agents for bleeding detection and acoustic hemostasis". Vesna Zderic, Wenbo Luo, Andrew Brayman, Lawrence Crum and Shahram Vaezy, presented at the 149<sup>th</sup> meeting of the Acoustical Society of America, Vancouver, BC (May, 2005).
  248. "Modeling of initial bubble growth rates during high intensity focused ultrasound", Wayne Kreider, Michael Bailey and Lawrence A. Crum, presented at the 149<sup>th</sup> meeting of the Acoustical Society of America, Vancouver, BC (May, 2005).
  249. "Color Doppler guided high intensity focused ultrasound for hemorrhage control", Vesna Zderic, Brian Rabkin, Lawrence A. Crum and Shahram Vaezy, presented at the 149<sup>th</sup> meeting of the Acoustical Society of America, Vancouver, BC (May, 2005).
  250. "Nonlinear enhancement and saturation phenomena in focused ultrasound beams of various geometry", Vera Khokhlova, Marina Basova, Michael Bailey and Lawrence A. Crum, presented at the 149<sup>th</sup> meeting of the Acoustical Society of America, Vancouver, BC (May, 2005).
  251. "Ultrasound imaging for high intensity focused ultrasound therapy", Shahram Vaezy, Vesna Zderic and Lawrence A. Crum, presented at the 150<sup>th</sup> meeting of the Acoustical Society of America, Minneapolis, MN (May, 2005).
  252. "A noncontact transporter in water using ultrasonic traveling waves", Shinfuku Nomura, Thomas Matula and Lawrence A. Crum, presented at the 150<sup>th</sup> meeting of the Acoustical Society of America, Minneapolis, MN (May, 2005).



253. "The influence of acoustic parameters on the intravascular inertial cavitation activity using a rabbit ear model with Optison", Juan Tu, Joo Ho Hwang, Andrew Brayman, Thomas Matula and Lawrence A. Crum, presented at the 5<sup>th</sup> International Symposium on Therapeutic Ultrasound, Boston, MA (September, 2005).
254. "High throughput HIFU treatment for intraoperative resection of solid organs", Vesna Zderic, Jessica Foley, Grant O'Keefe, Lawrence A. Crum and Shahram Vaezy, presented at the 5<sup>th</sup> International Symposium on Therapeutic Ultrasound, Boston, MA (September, 2005).
255. "Targeted venous thrombosis *in vivo* by induction of intraluminal cavitation using HIFU and ultrasound contrast agent", Joo Ha Hwang, Juan Tu, Andrew Brayman and Lawrence A. Crum, presented at the 5<sup>th</sup> International Symposium on Therapeutic Ultrasound, Boston, MA (September, 2005).
256. "Selective liver vessel occlusion with an ultrasound-guided HIFU phased array", Vesna Zderic, Lawrence A. Crum and Shahram Vaezy, presented at the 5<sup>th</sup> International Symposium on Therapeutic Ultrasound, Boston, MA (September, 2005).
257. "*In vivo* study of the correlation between ultrasound-induced inertial cavitation and Vascular endothelial damage", Joo Ha Hwang, Juan Tu, Andrew Brayman, Thomas Matula and Lawrence A. Crum, presented at the 5<sup>th</sup> International Symposium on Therapeutic Ultrasound, Boston, MA (September, 2005).
258. "Measurement and modeling of acoustic fields in a gel phantom at high intensities", Michael Canney, Michael Bailey, Lawrence a. Crum and Vera Khokhlova, presented at the 5<sup>th</sup> International Symposium on Therapeutic Ultrasound, Boston, MA, (September, 2005).
259. "Nonlinear mechanisms of lesion formation by high intensity focused ultrasound", Vera Khokhlova, Michael Bailey, Justin Reed, Michael Canney, Peter Kaczkowski and Lawrence A. Crum, presented at the 5<sup>th</sup> International Symposium on Therapeutic Ultrasound, Boston, MA (September, 2005).
260. "Ultrasound contrast agents for bleeding detection and acoustic hemostasis", Vesna Zderic, Lawrence A. Crum and Shahram Vaezy, presented at the 5<sup>th</sup> International Symposium on Therapeutic Ultrasound, Boston, MA (September, 2005).
261. "High-throughput HIFU for the intraoperative resection of solid organs", Vesna Zderic, Jessica Foley, Grant O'Keefe, Lawrence A. Crum and Shahram Vaezy, presented at the 2005 IEEE International Ultrasonics Symposium, Rotterdam, Netherlands (October, 2005).
262. "Quantifying inertial cavitation produced in *in vivo* rabbit ear vessels with Optison", Juan Tu, Joo Ha Hwang, Andrew Brayman, Thomas Matula and Lawrence A. Crum, presented at the 2005 IEEE International Ultrasonics Symposium, Rotterdam, Netherlands (October, 2005).

263. "Ultrasound contrast agents for bleeding detection and acoustic hemostasis", Vesna Zderic, Lawrence A. Crum and Shahram Vaezy, presented at the 2005 IEEE International Ultrasonics Symposium, Rotterdam, Netherlands (October, 2005).
264. "Selective liver vessel occlusion with an ultrasound-guided HIFU phased array", Vesna Zderic, Lawrence A. Crum and Shahram Vaezy, presented at the 2005 IEEE International Ultrasonics Symposium, Rotterdam, Netherlands (October, 2005).
265. "Use of HIFU for vessel occlusion", Joo Ha Hwang, Michael Kimmey, Andrew Brayman and Lawrence A. Crum, presented at the World Congress on Ultrasonics—Ultrasonics International, Beijing, PRC (September, 2005).
266. "Nonlinear HIFU fields; acoustic characterization and mechanisms of action", Vera Khokhlova, Michael Canney, Michael Bailey, Oleg Sapozhnikov and Lawrence Crum, presented at the 6<sup>th</sup> International Symposium on Therapeutic Ultrasound, Oxford, UK (August, 2006).
267. "*In vitro* kidney stone erosion with dual frequency HIFU", Rebecca Taylor, Michael Bailey, Tatiana Khokhlova, Teiichiro Ikeda, Yoichiro Matsumoto and Lawrence A. Crum, presented at the 6<sup>th</sup> International Symposium on Therapeutic Ultrasound, Oxford, UK (August, 2006).
268. "Advantage of a Broad Focal Zone in SWL: Synergism Between Squeezing and Shear", Oleg A. Sapozhnikov, Michael R. Bailey, Adam D. Maxwell, Brian MacConaghy, Robin O. Cleveland, James A. McAteer, and Lawrence A. Crum, presented at the 1st Annual International Urolithiasis Research Symposium Indianapolis, Indiana (November, 2006).
300. "Characterization of High Intensity Focused Ultrasound Fields with a High Spatio-Temporal Resolution", Michael S. Canney, Vera A. Khokhlova, Michael R. Bailey, Oleg A. Sapozhnikov and Lawrence A. Crum, Presented at the 2006 International Ultrasonics Symposium (Vancouver, BC), October, 2006.
301. "Calculations and Measurements of How Kidney Stones Fracture in Lithotripsy", "Michael R. Bailey, Oleg A. Sapozhnikov, Adam D. Maxwell, Brian MacConaghy, Robin O. Cleveland, James A. McAteer, and Lawrence A. Crum, Presented at the 2007 Meeting of the ASME, (Seattle, WA), March, 2007.
302. "Shock formation and millisecond boiling in tissue phantoms of varying absorption due to high intensity focused ultrasound", M.S. Canney, M.R. Bailey, V.A. Khokhlova, and L.A. Crum, Presented at the 2007 Meeting of the ASME, (Seattle, WA), March, 2007.
303. "Asymmetric Collapses of Free-Field Lithotripsy Bubbles", Wayne Kreider, Michael R. Bailey, Eric Johnsen, Tim Colonius, Lawrence A. Crum, Presented at the 2007 Meeting of the ASME, (Seattle, WA), March, 2007.
304. "Use of scattering of ultrasound pulses and shock waves by kidney stones for imaging in lithotripsy", Oleg A. Sapozhnikov, Neil R. Owen, Michael R. Bailey, Alexander I. Gromov, and Lawrence A. Crum, presented at the 14<sup>th</sup> International Congress on Sound and Vibration, Cairns, Australia (July, 2007).

III. Technical Reports and Book Reviews

- I. "Acoustic Interaction of Linear and Planar Arrays of Small Magnetostrictive-Stack Sonar Transducers at an Air-Water Surface," F.B. Stumpf and L.A. Crum, Tech. Rept. for ONR Contract Nonr-4419 (01), June (1966).

2. "The Study and Use of Compliant Tubes to Influence the Acoustic Interaction between Small Transducers at an Air-Water Surface," F.B. Stumpf and L.A. Crum, Tech. Rept. for ONR Contract Nonr-4419 (02), June (1967).
3. "Acoustic Interaction for Arrays of Small Magnetostrictive-Stack Sonar Transducers at an Air-Water Surface," F.B. Stumpf, R.T. Richards, and L.A. Crum, Tech. Rept. for ONR Contract Nonr-4419 (03), July (1968).
4. "The Motion of Bubbles in a Stationary Sound Field," L.A. Crum and A.I. Eller, Tech. Memo. No. 61, Acoustics Research Lab Harvard University (1969).
5. "The Acoustic Radiation Pressure on a Liquid Droplet in a Stationary Sound Field," Tech. Memo. No. C-1, Michaelson Physical Laboratory, U.S. Naval Academy, MD (1970).
6. "An Ultrasonic Device for Monitoring Liquid Monopropellant Stability," Tech. Rept. No. C-277, Naval Ordnance Station, Indian Head, MD, June (1977).
7. Review of Physical Acoustics, R.B. Lindsay, Ed., J. Acoust. Soc. Amer. **57**, 1000 (1975).
8. "The Effect of a High Power Ultrasonic Device on Liquid Monopropellants," Tech. Rept. No. C-175, Naval Ordnance Station, Indian Head, MD, September (1975).
9. "Nucleation and Cavitation Inception in Water," L.A. Crum, Tech. Rept. No. C-276, Naval Sea Systems Command, October (1976).
10. "Acoustic Cavitation Inception in Water and in Insonated Root Tips," Tech. Rept. No. 178 for Office of Naval Research Contract NR 384-923 (1978).
11. "Nucleation Stabilization and Growth of Microbubbles in Water," Tech. Rept. No. 278 for Office of Naval Research Contract NR 384- 923 (1978).
12. "Air Bubble Growth by Rectified Diffusion," Tech. Rept. No. 802 for Office of Naval Research Contract N00014-79-C-0404 (1980).
13. "Mie Scattering as a Technique for the Sizing of Air Bubbles," with G.M. Hansen, submitted to the Office of Naval Research as Technical Report No. 1-84 in June (1983).
14. "An Acoustic Levitation Technique for the Study of Nonlinear Oscillations of Gas Bubbles in Liquids," by L.A. Crum and D.A. Young, submitted to the Office of Naval Research as a technical report in August (1983).
15. "Optical Sound Generation and Amplification," by H. Bass, L. Crum, and F. Shields, submitted to the Office of Naval Research as an Annual Summary Report in January (1984).
16. "Acoustic Cavitation and Bubble Dynamics," with A. Atchley submitted the Office of Naval Research as Technical Report No. 2-85, June (1985).

17. "The Nucleation of Cavitation in Aqueous Media," with A. Atchley, submitted to the Office of Naval Research as Technical Report No. 1-85, January (1985).
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#### **Supervision of Graduate Students**

<u>Name</u>	<u>Degree</u>	<u>Year</u>	<u>Thesis Title</u>
Gary Hansen	Ph. D.	1983	Rectified Diffusion at Megahertz Frequencies
James Brosey	M.S.	1983	The Effect of Polymer Additives on the Acoustic Cavitation Threshold of Water
David Young	M.S.	1984	The Pulsation Amplitude of Gas Bubbles in a Stationary Sound Field
Ronald Roy	M.S.	1984	The Pulsation Amplitude of Gas Bubbles in a Stationary Sound Field
Kerry Commander	Ph. D.	1985	Nonlinear Oscillations of an Individual Gas Bubble Pulsating in a Liquid
Anthony Atchley	Ph. D.	1985	Acoustic Cavitation Nucleation and Stabilization Mechanisms
J. Brian Fowlkes	Ph. D.	1987	Cavitation from Microsecond Length Acoustic Pulses
R. Glynn Holt	Ph. D.	1988	Forced radial oscillations of single cavitation bubbles
Hugh Pumphrey	Ph. D.	1989	The underwater sound of rainfall
Steve Horsburgh	Ph. D.	1990	Thresholds for surface wave generation on acoustically levitated gas bubbles

D. Felipe Gaitan	Ph. D.	1991	Observation of sonoluminescence from a single stable cavitation bubble in a water/glycerine mixture
Kenneth Markiewicz	M.S.	1992	Collective oscillations in fresh and salt water bubble clouds
Jeff Schindall	Ph. D.	1993	Low-frequency backscatter from dense submerged bubble clouds
Sean Cordry	Ph. D.	1994	Some light emission features of single bubble sonoluminescence
Yia Mao	Ph. D.	1995	Acoustically enhanced bubble growth at low frequencies and its implications for human diver and marine mammal safety
John Allen	Ph. D.	1996	Mass diffusion in cavitation vapor bubbles
Adam Calabrese	Ph. D.	1997	Duty cycle and pulse length dependence of the acoustic cavitation threshold at megahertz frequencies
Suzanne Bloch	M.S.	1998	Measurements of sound speed in excised tissue over temperatures expected under high intensity focused ultrasound conditions
Sandy Poliachik	Ph. D.	1999	Effect of high intensity focused ultrasound on whole blood with and without contrast agents
Francesco Curra	Ph. D.	2001	3D full wave ultrasonic field and temperature simulations in biological tissue containing a blood vessel
Tyrone Porter	Ph. D.	2003	Influence of chemical composition of membrane-disrupting polymers on relative cavitation activity and hemolysis
Wen Chen	Ph. D.	2003	Ultrasound contrast agent behavior near the fragmentation threshold
Dahlia Sokolov	Ph. D.	2004	An optimal protocol for shock wave delivery by the dual-pulse lithotripter
Joo Ha Hwang	Ph. D.	2005	Use of HIFU for vessel occlusion

Ajay Anand	Ph. D.	2005	A real-time temperature monitoring system for HIFU applications
Neil Owen	M.S.	2005	Development of power supplies for portable HIFU therapy systems
Justin Reed	M.S.	2006	Nonlinear analysis of HIFU transducers
Wayne Kreider	Ph. D.		
Michael Canney	Ph. D.		
Juan Tu	Ph. D.	2006	Fundamental aspects of ultrasound contrast agent dynamic behavior

#### **Supervision of Postdoctoral Students**

<u>Name</u>	<u>Years</u>	<u>Project Title</u>
Ali Kolaini	1989-92	Underwater ambient noise
Michael Nicholas	1990-92	Underwater noise from bubble clouds
K. J. Park	1990-91	Collective oscillations from bubble clouds
Thomas Matula	1993-95	Sonoluminescence
Michaelus Averkiou	1993-95	Nonlinear acoustics and lithotripsy
Michael Bailey	1995-97	Nonlinear acoustics and lithotripsy
Robin Cleveland	1995-97	Nonlinear acoustics and lithotripsy
Inder Makin	1997-99	Ultrasound-induced thrombolysis
Peter Chang	1998-2000	Ultrasound contrast agents
Francesco Curra	2000-2002	HIFU modeling
Cyril Lafon	2002-2004	Therapeutic ultrasound
Stuart Mitchell	2004-2005	Tumor treatment with HIFU
Vesna Zderic	2004-2005	Acoustic Hemostasis